The Epi-Olmec Text on a Teotihuacan-Style Mask with Special Reference to Ritual Practices Referred to in Epi-Olmec Hieroglyphic Texts

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The Epi-Olmec Text on a Teotihuacan-Style Mask with Special Reference to Ritual Practices Referred to in Epi-Olmec Hieroglyphic Texts

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We got to know Alfonso Lacadena in the late 1990s, while attending the Maya Meetings at the University of Texas. Alfonso epitomized what being a scholar should be, personally and professionally: an engaged academic, exploring alternatives openly and honestly, following paths of research wherever they led. He was generously willing to share his insights, eager to know what others' insights were, and straightforward—not aggressive or hostile—when he disagreed with them.

He was knowledgeable about script and iconography in various subregions of Mesoamerica, and made important contributions to the interpretation of Epigraphic Mayan texts, and circum-conquest Nawa texts.

Alfonso was an early explorer of the grammatical structures of words attested in Mayan hieroglyphic texts, beginning with his recognition of antipassive constructions, and was one of few to make really significant contributions concerning the evolution of Mayan hieroglyphic writing.

Most importantly, Alfonso raised people up. He encouraged and assisted the professionalization of younger colleagues, students and strangers alike. He used his talents and accomplishments to assist established professionals and aspiring colleagues alike. In our case, he was almost entirely responsible for providing Epigraphic Mayan cognates for entries in the first edition of our Preliminary Mayan Etymological Dictionary (Kaufman with Justeson 2003).

We miss the fruitful conversations we had with him, the care and insight he brought to the understanding of ancient Mayan languages and their textual expression, and the person he was. We dedicate this study to his memory.

This article applies our previous work on the decipherment of epi-Olmec writing to the analysis, reading, and interpretation of a text that had been unknown to scholarship when that work was carried out, and is the second longest epi-Olmec text now known. No revisions in our earlier readings of any syllabogram proves to be required, but the set of interpretable syllabograms and logograms has been increased by the new data. It addresses recurring facets of the structure and content of epi-Olmec hieroglyphic texts, and the cultural practices they record or reflect. It focuses on the event structure of epi-Olmec rituals as they come to light in the longest epi-Olmec texts, supplemented by data from shorter texts and from iconographic representations of elements of epi-Olmec rituals.

This article has two main parts: Part I presents our reading of this text, and exploits it to advance the decipherment of the epi-Olmec writing system. As in our previous work, doing this hinges on establishing its conformity with the grammatical structure and vocabulary of reconstructed proto-Sokean and/or pre-proto-Sokean (for which see especially Kaufman and Justeson 2004a and Wichmann 1995).[1] Working out the grammatical structure of the text depends crucially upon the pattern of use of syllabograms whose pronunciation corresponds to high-frequency obligatory inflexional affixes and on the most productive derivational affixes that have *CV* (=consonant-vowel) or *CVC* pronunciations. Working out the meaning of

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[1] Mije-Sokean is a family of languages with a common ancestor, called "proto-Mije-Sokean" (pMS). Proto-Mijean (pMi) is the last common ancestor of the Mijean languages, and proto-Sokean (pSo) is the last common ancestor of the Sokean languages. Proto-Sokean had two descendants: proto-Soke (pSoke), the ancestor of the Chiapas Soke languages and of the Oaxaca Soke languages; and proto-Gulf Sokean, the ancestor of Soteapan Gulf Sokean and of Texistepec and Ayapa Gulf Sokean. The epi-Olmec texts were written in Sokean. The earliest are clearly pre-proto-Sokean: they are in the Sokean branch, but retain archaisms—proto-Mije-Sokean characteristics that were lost by the proto-Sokean stage. No pre-proto-Sokean archaisms have been recognized in the latest epi-Olmec texts, from the Classic period—including the mask text and the inscriptions of Cerro de las Mesas. Neither do we recognize clear innovations; but since the latest dated Classic text is 568 years after the earliest, some of the vocabulary and grammar must be different.

the text depends on the constraints provided by correlating reconstructed Sokean vocabulary with the text's patterning of previously read signs, syllabic and logographic, and on clues to meaning and to sentence structure that are provided by calendrical statements; not only do patterns of dates provide information on meaning, but in epi-Olmec texts they are almost always followed by a sentence and so constrain the grammatical analysis.

Part II exploits this text to focus on those features that are most important for characterizing epi-Olmec ritual patterns. It is notable that, in spite of its connection to Teotihuacan and possibly to Teotihuacan ritual practices, the ritual acts mentioned in the text, and their sequence, are consistent with those attested in the La Mojarra and Tuxtla Statuette texts. Part II identifies the ritual acts mentioned in these three texts, the regularities in the cultural contexts of different kinds of ritual events, in the sequencing of individual ritual acts within them, and the overall scheduling of these events in terms of a specifically epi-Olmec calendrical cycle.

The epi-Olmec cultural context

Archaeologists working in the Olmec area have recognized four broad temporal phases of the Olmec cultural tradition.

The structural and stylistic design features diagnostic of "Classical" Olmec artifacts first appear in the Early Preclassic, Lowe's (1989) "Initial Olmec" period. In this era, material manifestations of higher-level community organization and controlling elites are recognized in and around San Lorenzo in the south, Tres Zapotes to the north-west, and La Venta to the north-east. The Olmec colossal heads, quintessential markers of this period of the tradition, date to this era and are associated with just these three sites, but major Olmec centers are also found elsewhere in the region.

Olmec material culture continues at these sites in the Middle Preclassic (c. 900–600 BCE), Lowe's "Intermediate Olmec" period, and spreads to the Chiapas highlands with a center at Chiapa de Corzo in the Chiapas highlands. Recognizably Olmec material culture traditions continued into what Lowe (1989) labels the "Terminal Olmec" phase (c. 600–300 BCE) at La Venta, Chiapa de Corzo, and Tres Zapotes.

These traditions continue, in altered form, at Tres Zapotes and neighboring communities in the north-west and at Chiapa de Corzo

in the south, in Lowe's "epi-Olmec" period (c. 300–1 BCE). Both of these sites, and their environs, have been subject to detailed and long-term archaeological investigation, Tres Zapotes by Christopher Pool and colleagues and Chiapa de Corzo by the New World Archaeological Foundation.

Lowe (1989: 61–65) summarizes the beginnings of the epi-Olmec cultural tradition, when "the traditional markers of Olmec culture come to an end", around 300 BCE. In the easternmost part of the Olmec northern Isthmian plain, including the site of La Venta, Terminal Olmec ceramic assemblages were replaced and monuments were "typologically very distinct" (Lowe 1989: 61, 63) from Olmec norms; Olmec culture is thought to have been replaced there. At San Lorenzo, and at that site alone, ceramic assemblages continue Olmec patterns in the Remplás complex (Coe 1970: 30–31; 1981: 134; Lowe 1989: 63), but with no new architecture, sculpture, or other traces of high-level political/administrative activity. Rust (2008: 91) reports local centers, after a hiatus, between 300 BCE and 250 CE in the vicinity of La Venta. Von Nagy (personal communication, 2018) tells us that there is too little data to form a clear picture of the settlement hierarchy in the Isthmus generally, because of insufficient archaeological investigation.

Administrative centers showing continuity in ceramic assemblages and stylistic features persisted in the "highlands" of the Chiapas Depression, including Chiapa de Corzo, and in the Papaloapan Basin. For the Papaloapan region, Coe made its relationship to the Olmec tradition explicit: he characterized the Tuxtla Statuette as "a small jade figure in epi-Olmec style" (Coe 1962: 94), and Tres Zapotes Stela C, "with an epi-Olmec mask" (Coe 1965: 696), as works of art "in a style which is *derivative* from Olmec, but not in the true canon" (Coe 1962: 92). These two objects bear the first known examples of the epi-Olmec writing system.

Chiapa de Corzo and the Papaloapan Basin, though separated by 200 miles, had been in contact in Terminal Olmec times, and remained in contact in the epi-Olmec era. A notable exemplification comes from the extraordinary Tomb 7 of Chiapa de Corzo Mound 1, dating to 100 BCE (Clark 2017: 271 and personal communication, 2018). The figure buried in this tomb was surrounded by 35 ceramic vessels, "all apparently imported from other regions of Mesoamerica" (Lowe

and Agrinier 1960: 47–50)—from Oaxaca (3), El Salvador (5), Guatemala (12), and from Veracruz (6 surely, 6 probably, 3 possibly). Lowe and Mason (1965: 215) indicate that the Veracruz origin of three of these vessels, from "the Los Tuxtlas region", is confirmed by paste analysis.

In the epi-Olmec period, no directionality can be determined, but several diagnostically epi-Olmec features of elite culture were shared by Chiapa de Corzo and the area from Tres Zapotes to the Laguna de Alvarado in the Terminal Preclassic era:

1. the epi-Olmec script, which appears on at least eight objects from the Papaloapan Basin—Tres Zapotes Stela C, the Tuxtla Statuette, the La Mojarra stela, the Alvarado stela, and at least four monuments from Cerro de las Mesas—and otherwise only at Chiapa de Corzo, on a potsherd and likely also on a wall panel (not one example is known from the Isthmus);[2]

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[2] With no epi-Olmec text known to come from the Isthmus of Tehuantepec, the use of the term "Isthmian" for this script, championed by Houston and Coe, is an oxymoron. The ten epi-Olmec texts with known provenience were found in archaeological zones outside the Isthmus; the other (two) known epi-Olmec texts, in private collections, are of unknown provenience. Neither has any other trace of the epi-Olmec cultural tradition yet been found in the Isthmus—neither diagnostic archaeological assemblages nor even one epi-Olmec object. Justeson (1986: 447), in a frankly careless revision of Lowe's "Greater Isthmian tradition" term, made the error of introducing the term "Isthmian" for the epi-Olmec script on a presumption that it would have had a continuous distribution, thus from two southern attestations at epi-Olmec Chiapa de Corzo to the more numerous northern examples at epi-Olmec Cerro de las Mesas.

Houston and Coe (2003: n1) embrace the factually inaccurate term "Isthmian" and, quoting us out of context, claim that we use the term epi-Olmec (a) because of our believing that "'the archaeological cultures of the area descended from that of the Olmecs'", and—clearly falsely—(b) that we believe this "because" (their word) "'the script itself may descend from an Olmec hieroglyphic system'" (suppressing the remainder of the sentence in which we say that there is no evidence for this possibility). They further claim, on no evidence whatsoever, that we "appear to favor 'epi-Olmec' because it buttresses a separate argument, made by Campbell and Kaufman (1976), that the Olmecs spoke Mixe-Zoquean languages" (Houston and Coe 2003: n1).

In fact, we adopted "epi-Olmec" to refer to the script because that was the standard term being used at the time by archaeologists working in the region, notably in the then-recent landmark synthesis by Gareth Lowe (1989). Houston and Coe's claims are the more misleading because the term was not introduced by us but by Coe himself, in the early 1960s (see discussion in text, above). Coe's term was adopted and repeatedly used by specialists on the region. The first to do so seems to have been his mentor, Gordon Willey, who used it repeatedly from shortly after Coe introduced it (e.g., Willey 1969), and applied it specifically to the La Mojarra stela (Willey 1990) before our own joint work on epi-Olmec writing began. It was generally adopted by the leading archaeologists investigating the epi-Olmec cultural

epi-Olmec monument		long count	divinatory calendar date		date in 365-day year	
			epi-Olmec	Mayan	epi-Olmec	Mayan
Chiapa de Corzo	wall panel	7.16.3.2.13	6 Reed (XIII)	6 XIII		16 VI
Tres Zapotes	Stela C	7.16.6.16.18	6 ??	6 XVIII	? II	1 II
La Mojarra	stela	8.5.3.3.5	13 Snake (V)	13 V	3 ?	3 XVII
La Mojarra	stela	8.5.16.9.7	5 Deer (VII)	5 VII	15 (snake)	15 I
"Tuxtla"	statuette	8.6.2.4.17	8 ??	8 XVII		0 XIV
Cerro d.l. Mesas	Stela 6	9.1.12.14.10	1 Dog (X)	1 X		3 XIX
Cerro d.l. Mesas	Stela 5	9.4.14.1.4	7 ??	7 IV		12 VIII
Cerro d.l. Mesas	Stela 8	9.4.18.16.8	9 ??	9 VIII		11 IV

Table 1. Epi-Olmec long count dates, showing that epi-Olmec divinatory calendar dates agree with Mayan for each long count date.

2. epi-Olmec design elements, that appear on the carved human femurs from Chiapa de Corzo (Agrinier 1960) and at Tres Zapotes, La Mojarra and El Mesón (e.g., Justeson and Kaufman 2008: 175–176);

3. long-count chronology, on the Chiapa de Corzo wall panel (a.k.a. "Stela" 2) and on Tres Zapotes Stela C, the Tuxtla Statuette, the La Mojarra stela, and Cerro de las Mesas Stela 5, 6, and 8;

4. dates recorded in a distinctively epi-Olmec calendrical cycle, discussed below, which occur on the Chiapa de Corzo wall panel, the La Mojarra stela, and three monuments from Cerro de las Mesas.

Epi-Olmec calendrics and chronology

It has long been known that epi-Olmec and Mayan long count dates have the same calibration to the divinatory calendar (cf. Morley's comments quoted by Holmes 1907: 698; Morley 1915: 196; Proskouriakoff 1950: 186; Coe 1957: 606–607). Table 1 presents the epi-Olmec dates expressed in long count notation whose divinatory calendar

tradition (e.g., his student Barbara Stark), and in particular, it is the term used by Lowe in his (1989) state-of-the-art synthesis on the heartland Olmec cultural tradition, and earlier publications (e.g., Lowe 1981: 242). We, and most others working on the script after George Stuart distributed his drawing of La Mojarra Stela 1, adopted it from this literature, as a purely descriptive identifier—apart from incorporating the fact that the tradition, as Coe stated, is derivative from but not identical to Olmec. It is Houston and Coe who are revisionist here—of Coe's own contributions and thinking, and judging from their framing of the matter in personal attacks, as a matter of academic politics rather than substantive issues.

Figure 1. The jaguar-head patron sign for the initial series introducing glyph on Tres Zapotes Stela C (photographs, under different lighting to bring out different details, by Jorge Pérez de Lara, with Justeson's assistance; used by permission).

dates are wholly or partially known. For each one, the trecena numeral is the same as if the long count were Mayan, and when the form of the epi-Olmec day sign agrees with those of early Mayan and other Mesoamerican traditions, that sign agrees with the Mayan day name for the same final digit of the long count date.

Both epi-Olmec and Mayan long counts have as a component of a "long count introducing glyph" a set of signs or sign groups that epigraphers refer to as the month's "patron". The patron on Tres Zapotes Stela C, the depiction of a jaguar's head (Figure 1), appears as the patron of the first month in Mayan, and of that month only; but a Mayan long count date 7.16.6.16.18 would correspond to the second month (cf. Stirling 1939: 213; 1940: 4).[3]

James Fox (personal communication to Justeson, 1988; cited by Justeson and Kaufman 1996[1992]: 22–23) pointed out that the same patron appears on (Mayan) Altar 12 at Takalik Abaj, for the first month, and that it is preceded by a patron including the form of a coiled being (presumably a snake) and followed, with one patron intervening, by a clear "Zip monster" that is the patron of the third

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[3] Coe (1976: 113) incorrectly stated that the depicted month patron of the long count introducing glyph is that of the second Mayan month; in fact, the form of the Tres Zapotes glyph has nothing in common with the attested Mayan patron glyphs for the second month, none of which actually depicts a jaguar or jaguar's head. In contrast, every Classic period example of the patron of the first month depicts the head of a jaguar; the head of the Takalik Abaj patron agrees with these forms.
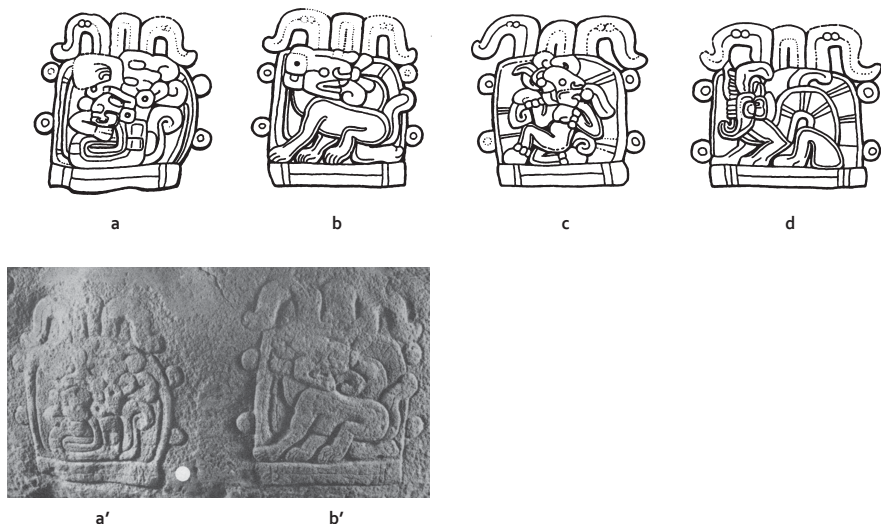
Figure 2. Sequential month patrons from Takalik Abaj Altar 12. Patrons are for *a)* Cumku, the 18th month, *b)* Pop, the first month, *c)* Uo, the second month, and *d)* Zip, the third month (drawing by James Porter; used by permission of John Graham and his Abaj Takalik Project). Photographs *a')* and *b')* correspond to drawings *a)* and *b)* (Graham et al. 1976: pl. 12).

Mayan month; see Figure 2. Fox had thereby shown that, in the Mayan texts at Takalik Abaj, a coiled being is a patron from the end of the preceding year. At La Mojarra, a coiled snake is the form of the patron of the second long count date, 8.5.16.9.7, which would fall on the 15th day of the first month in Mayan—again, the epi-Olmec long count falls a month earlier in the 365-day year than it does in Mayan.

Because this long count date is recorded as falling on day 15 of the epi-Olmec month, this month cannot be the 5-day period at the end of the year. The other La Mojarra long count date, 8.5.3.3.5, falls on day 3 of what would be the 17th Mayan month, and this date falls 57 days earlier in the 365 day year; this requires that the 5-day period falls either immediately before the epi-Olmec coiled-snake month corresponding to Cumku, or 20 days earlier.

In principle, then, a long count could lead to the same day in real time for epi-Olmecs and Mayans (if their divinatory calendar dates also fell on the same day in real time), or epi-Olmec long counts could fall 20 or 40 days before the Mayan (if their calendar year dates fell

on the same day). The latter turns out to be the case. The La Mojarra text opens with the following statement:

> A sun-eating moon was happening.
>
> As a piercer, earlier, (the) bludgeon star [Venus] had shone;
>
> it was a late daytime one.

The elements of this translation are secured as follows:

The solar eclipse: The text opens with two signs, one overlaid upon the other. The one underneath is the syllabogram **pa**, which spells the incompletive aspect suffix on verbs in a main clause—so, the verb indicates that 'it was VERBing'; the subject follows the verb in this expression, which is typical in the La Mojarra text for non-agentive intransitive verbs.

 The next sign closely resembles the Mayan logogram that functions as both the word for 'moon' and the numeral '20' (although the Mayan words for these meanings differ); in the only surviving Mije-Sokean indigenous calendar, the word 'moon' is the name for the 20-day subdivisions ("months") of the 365-day year. The sign we (and others) treat here as 'moon' also appears toward the end of the La Mojarra text, where it functions numerically in spelling the number '23'. Specifically, it occurs in a statement that 'the 23rd jaguar got taken' ('23rd', not '23', because postposed numerals in Mije-Sokean are ordinals). This numerical value is verified by the otherwise coincidental fact this is the third of three successive recorded dates that mention jaguars, and these three dates span 23 days—one day for each jaguar.

The presence of the moon sign in expressing an event that takes place on the date of a solar eclipse that was visible at La Mojarra (and throughout the northern epi-Olmec region) calls for an explanation of the sign for 'moon' that relates to the occurrence of this eclipse. These two signs are preceded by a sign consisting of an animal head with an open mouth and bared teeth; the associated epi-Olmec long count date is that of a solar eclipse that was visible throughout the Papaloapan region. A widespread Mesoamerican expression for an eclipse, as a record of an event of that day, involves the sun or moon

being eaten; we take this animal head with bared teeth to refer to eating, and inasmuch as it was the sun that was getting eaten, we assign the reading 'sun' to the remaining sign, yielding 'sun-eating moon' or 'sun-eater moon'. Various Mesoamerican traditions indicate that during eclipses, the sun and moon are fighting or that one is being killed by the other. In this case, it is a sun-eater moon, the moon being the agent of a solar eclipse.

The whole sentence thus far is understandable as 'a/the sun-eating moon was VERBing', as a reference to a solar eclipse that took place on the recorded long count date. For the verb, we suggest pSo *tuk* 'to happen', both because it fits the rest of the statement semantically, and because the form of the sign, which appears to depict a blade with a handle, could be motivated by the homophonous descendant of pMS *tuk* 'to cut, to harvest'.

Venus: STAR was generally accepted as a sign corresponding to the Mayan STAR glyph based on its form, as originally suggested by David Kelley; we entertained but did not adopt this visual correspondence until we found that the two events referring to it were separated by 9×584 days—nine canonical 584-day Venus cycles.

A single sign, which we read as *ma* based on its use in spelling the period of a day (pSo *jama*), precedes the twice-used sign sequence corresponding to "Venus". This sign also appears twice in contexts where it must spell a whole word near the end of the narrative of events of a single day (MOJ Q3– 8 and U9–14), the same event having been mentioned among the first events mentioned for that day (MOJ O*30–33 and T31–36); the pSokean word *ma* means 'earlier', which agrees with these narrative patterns, and the sign begins the sequence spelling the word 'star' (pSo *matza7*), consistent with usage as a phonetic complement spelling the beginning of the pronunciation of that word.

Words for Venus in Mesoamerica consist of the word for 'star' plus a modifier; in Mije-Sokean, modifiers precede the nouns they modify. We therefore take the final sign as part of the spelling for the word 'star', and therefore as a phonetic complement to the STAR logogram. This could be pronounced either as *tza7* or *tza* but not as *7V*, since *7* (and the other "weak" consonants *h, w*, and *y*) is only spelled phonetically when it occurs before a vowel, unless, perhaps, the script includes *CV7* syllabograms.

The sign pair that precedes the STAR logogram we take to spell such a modifier. We hazard 'bludgeon' for this modifier in the La Mojarra text based on the form of the first two sign of the repeating spelling of this word: the first sign depicts a fleshless lower jawbone (pMS **pak* 'bone', also **pak* 'to strike (something or someone]'), and the other sign we take on other grounds to spell the syllable *ku*, which would spell the instrumental suffix *.kuy7* since *h*, *7*, *w*, and *y* are spelled phonetically only before vowels.

The sign we designate as PIERCE iconically resembles the Mayan logogram for this concept—a pointed shaft passing through an empty field in the epi-Olmec case, and through a phonetic complement **lu** (for *jul* 'to pierce [through]') in the Mayan case. (PSo **wu7tz* has the meaning 'to pierce through', and contrasts with verbs meaning 'to pierce [into]'.) The Mayan uses of this sign occur in the Venus pages of the Dresden Codex where five distinct Venus gods are said to pierce specified victims; Venus is also referred to as a "piercer" in colonial Nahua sources. The La Mojarra text provides a third instance of this characterization. Note that we have entertained sign comparisons with Mayan only when something in the immediate context supports the interpretation (Justeson and Kaufman 1993: 1709)—which is the case of this example. Because no verb suffixes are spelled out, under our characterization of epi-Olmec spelling conventions this logogram would have to represent a noun derived from the verb, thus *wu7tz.ʉ* 'piercer' or *wu7tz.i* 'something pierced'.

The word *tza7yji* 'late in the daytime' is spelled with a previously unidentified sign, followed by the sign for the syllable *ji* that was identified from patterns of verb morphology, in which it spells the marker *-ji* of completive aspect on incompletive verbs. Only three reconstructed two-syllable words end in *ji*, or in *ji* plus *7*, *h*, *w*, or *y*; 'late in the day' is relevant to descriptions of Venus, and agrees with the timing of the visibility of Venus on this date.

Using a Goodman-family correlation (specifically Goodman's 584 285 variant, favored by Lounsbury and Schele; cf. Martin and Skidmore 2012), the La Mojarra long count in Mayan would correspond to 22 May 143 CE. Twenty days earlier, on 2 May 143 CE, a solar eclipse was observable at dawn at La Mojarra and throughout the northern epi-Olmec region; on the previous afternoon (the text says "earlier"), Venus was indeed visible in the afternoon, and within a

day of its greatest distance from the sun (its maximum elongation) as evening star. Visible solar eclipses are so rare at any location that coincidence is not a credible possibility: it must be the days of the calendar year that were synchronous in epi-Olmec and Mayan, while the divinatory calendar and long count dates fall 20 days earlier in epi-Olmec than in Mayan, and the correlation constant for epi-Olmec long counts must be 584 265.[4]

The epi-Olmec circumnodal Venus cycle[5]

Of the seven other long count dates known from epi-Olmec texts, three fall near the same point in both the eclipse cycle and the Venus cycle—within ±8.4 days (out of 173.30906) of the same point in the internodal cycle, which is a span within which total lunar eclipses occur, and within ±12.5 days (out of 583.92166) of the same average position in the Venus cycle (empirically, centered on maximum elongation of the evening star). These spans amount to 4.27% and 9.70% of their respective cycles. This many repetitions near the same point in both cycles is statistically significant; had the "near" points spanned a full quarter of each cycle, the probability that as many as three out of seven dates would fall within the same quarter of each cycle would be less than ⅔ of 1%.[6] This shows that epi-Olmec inscriptions preferentially record long count dates near dates when an eclipse might be expected near the maximum elongation of Venus as evening star. The system of dates with these properties we therefore refer to as a "circumnodal Venus cycle" (CNVC). Notably, the scheduling of significant ceremonies recorded and illustrated on

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[4] An integer correlation coefficient in principle yields a real-time date corresponding to 6am on a Julian calendar date—roughly at dawn. In principle, the (unknown) time of day on which the long count date changes should be part of the determination of a correlation constant. However, this is irrelevant in the present case. At La Mojarra, the solar eclipse of May 2, 143 CE began at 6:23 am, with the sun just 5.8° above the eastern horizon, and was at is maximum obscuration locally (55.58%) at 7:20 am, with the sun at 19.2° above the horizon (data from Espenak and Meeus 2007).

[5] The discussion is based on Justeson (2007).

[6] We increase the "near" range substantially from the attested range because restricting to precisely the attested range would introduce a bias into the computation. The variation from the mean would have amount to more than 37% of the cycle length for the degree of clustering to fail a test of significance at the .05 level.

monuments relates closely to the actual dates of the corresponding astronomical phenomena.

Of the four remaining dates, two occur at close to the same distance from CNVC dates. The second La Mojarra long count date and the date on Cerro de las Mesas Stela 6 occur within +0.862 days of the same point in the Venus cycle and within +0.526 days of the same point in the eclipse cycle. Had the "near" points spanned a quarter of each cycle, the probability that two out of these four dates would fall within the same quarter of each cycle would be less than 2.06%.[7]

The Venus cycle and the internodal cycle commensurate after 65 Venus cycles (37 954.9079 days) and 291 eclipse cycles (37 954.6841 days), accumulating a long-term divergence of 5 hours and 22 minutes in 103 years and 11 months.

When the long count dates are adjusted by subtracting multiples of 65 Venus cycles, their relative placement in a 65-Venus year cycle can be determined. The results are as follows:

MES 5	=	0 (or 65)	Venus cycles
MES 5 to MES 8	≈	3	Venus cycles
MES 5 to MES 6	≈	11	(–65) Venus cycles
MES 5 to MOJ (1st)	≈	19	(–4×65) Venus cycles
MES 5 to MOJ (2nd)	≈	27	(–4×65) Venus cycles
MES 5 to CHP 2	≈	38	(–6×65) Venus cycles

A station at n Venus cycles has almost the same deviation from an internodal cycle as a station at 65–n average Venus cycles (averaging within ¼ day). If the CNVC is based, as it appears, on a close commensuration of the two cycles, then these "complement" intervals should also reach CNVC stations; and, indeed, both 27 and 35 (=65–27) Venus cycles are among the attested CNVC stations. We must, therefore, entertain stations around 46, 54, and 62 Venus cycles (=65–19, 65–11, and 65–3) as being potentially equally viable CNVC stations as those that are attested.

The fact that stations 27 and 35, having equal discrepancies between their Venus and internodal correlates, are both attested

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[7] The range of variation from the mean would have amount to nearly 32% of the cycle length for this degree of clustering to fail a test of significance at the .05 level.

internodal cycles	10	27	37	54	64
length in days	1733.1	4679.3	6412.4	9358.7	11091.8
internodal intervals	10	17	10	17	10
Venus cycles	**3**	8	**11**	16	**19**
length in days	1751.8	4671.4	6423.1	9342.7	11094.5
Venus intervals	**3**	5	**3**	5	**3**

internodal cycles	91	101	118	128	155
length in days	15771.1	17504.2	20450.5	22183.6	26862.9
internodal intervals	27	10	17	10	27
Venus cycles	**27**	30	35	**38**	46
length in days	15765.9	17517.6	20437.3	22189.0	26860.4
Venus intervals	8	3	5	**3**	8

internodal cycles	165	182	192	209	219
length in days	28596.0	31542.2	33275.3	36221.6	37954.7
internodal intervals	10	17	10	17	10
Venus cycles	49	54	57	62	**65 / 0**
length in days	28612.2	31531.8	33283.5	36203.1	37954.9
Venus intervals	3	5	3	5	**3**

Table 2. Model for CNVC stations fitted to the pattern of attested examples. (a) Data in heavy outlines, with white background, are based on long count dates from epi-Olmec monuments; their average Venus and internodal intervals are in larger type. (b) Stations at one of these intervals *before* the 65th Venus cycle—at complementary positions in the table—have a white background, and their average Venus and internodal intervals are in larger type. (c) Stations whose average Venus and internodal intervals are closer than any of those in (a) have grey backgrounds and smaller type.

stations, suggests that dates at *smaller* average distances than other attested stations should also be candidates for CNVC stations. The maximum average deviation of the Venus and internodal cycles among the above CNVC stations is close to 3 average Venus cycles (1751.7650 days) and 10 internodal cycles (1733.0906 days), for a minimum discrepancy of 9.337 days (this is the distance between the long count dates of MES 5 and MES 8). Smaller average distances are found at 8, 16, and 30 Venus cycles (3.986, 7.971, and 6.717 days, respectively), and so from their complements at 35, 49, and 57 Venus cycles.

The resulting model for the placement of CNVC stations consists of 15 stations in any span of 65 Venus cycles; see Table 2. After 65 Venus

cycles, the same sequence of stations repeats, but with discrepancies increasing by 0.22 days; it takes five passes through the 65-Venus-year cycle before a full day of discrepancy accumulates.

The CNVC can be seen as a functional counterpart among epi-Olmecs of Lowland Mayan katun-endings and hotun-endings, as the long-term historical cycle in terms of which civically or politically important actions were scheduled, and were recorded and depicted on Mayan monuments.

The La Mojarra text registers sets of events on several other dates that were indicated by specifying the days, months, and years elapsed between successive recorded events, and not by a long count date. One such event takes place on or near a CNVC station, 8 Venus years after the first, but most are not. One of them is the date of a long set of ritual activities that were scheduled, not at a station in the CNVC cycle, but on the ninth canonical Venus anniversary of the first Venus event: it occurs exactly 9×584 days after the first Venus event, where 584 days is the length of a canonical Venus cycle, and the association of this anniversary with Venus is also made clear because the narrative of the events of the day close with another statement that Venus was shining. So, while the CNVC cycle seems to have been tied to a correlation between the astronomical cycles of Venus and eclipses, the CNVC base dates were also the bases from which canonical Venus intervals were counted to schedule ritual activities. Both the CNVC cycle and canonical Venus anniversaries of its base play a key role in the scheduling of events recorded in the epi-Olmec text on the Teotihuacan-style mask.[8]

The second station linked to the CNVC occurs about 132 days later in the Venus cycle on the second La Mojarra long count and about 134 days later on that of Cerro de las Mesas Stela 6. (These two dates happen to be separated by three grand cycles, of 2×37 954+37 955 days.) This second type of station also appears in the mask's text.

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[8] For other purposes, daykeepers may sometimes have focused on eclipse recurrences rather than Venus anniversaries. The time count of 13 years and two days from the solar eclipse with which the inscription opens leads to or near another CNVC base on 8.5.16.3.7 (25 February, 156 CE). A partial (65% magnitude) lunar eclipse was visible at La Mojarra starting before midnight on the night of February 23 and lasting into February 24.

Linguistic constraints in epi-Olmec decipherment: Exemplification of structural constraints in our previous decipherment work

To provide a background on the kinds of inferences we draw from the structure of the mask text, we illustrate the role of Mije-Sokean phonology, morphology and vocabulary in our decipherment work on then-known epi-Olmec texts in the 1990s. Particularly in a long text like those of the La Mojarra stela or the epi-Olmec mask, we will often find a great deal of context filled in around a particular sign or sign group; the more constrained the context, the more straightforwardly and securely it can be interpreted.

Calibrating sign patterns to grammatical constraints led near the beginning of our work to the determination of the pronunciations of the signs for the syllables *wʉ*, *7i*, *pa*, and *ko*.

First, every proto-Sokean and proto-Mije-Sokean verb ended in a marker of aspect (completive vs. incompletive) or, more rarely, mood (optative or imperative). The choice among aspect markers depends on whether the verb is in an independent (main) clause or in a dependent (subordinate) clause.

In a narrative text, the independent completive aspect marker, pMS, pSo **wʉ*, should be by far the most common. In addition, **+wʉ7* was a clitic word ('relativizer') postposed to noun phrases; because the weak consonants *7*, *j*, *w*, and *y* were only spelled before vowels in epi-Olmec, a sign for the syllable *wʉ* should be by far the most common word-ending sign in a narrative text. Furthermore, the sound sequence *wʉ* was quite rare otherwise. The single most frequent sign in the La Mojarra text was recognized by presumably all who studied it as occurring overwhelmingly in word-final position; so identifying the sign for *wʉ* was straightforward.[9]

Similarly, pMS and pSo **7i+* is by far the most common word-initial grammatical morpheme in narrative texts: it is the agreement marker for third person (singular and plural) subjects of all transitive verbs, and of intransitive verbs in dependent clauses; and it begins all noun phrases that have third-person possessors. These contexts of the phoneme sequence *7i* account for the overwhelming majority

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[9] Before undertaking the decipherment on a full scale with Justeson, Kaufman in 1987 commented to Nick Hopkins and Kathryn Josserand: "If this text is in a Mije-Sokean language, this sign spells the syllable *wʉ*".
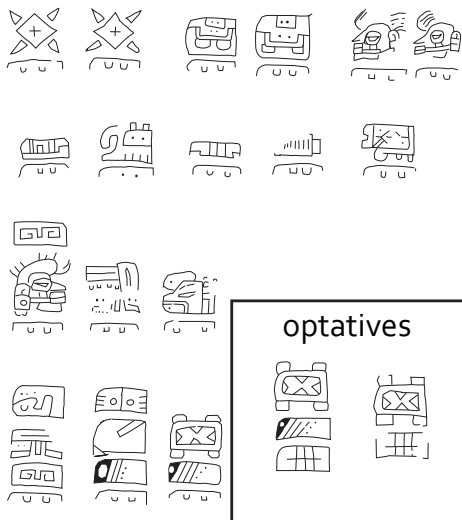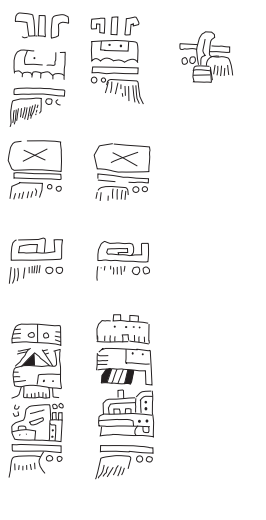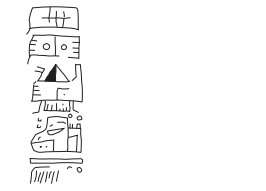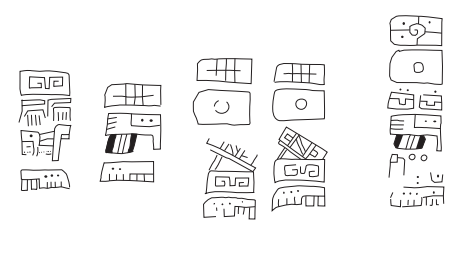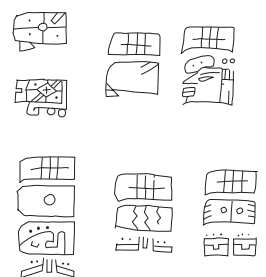
	completives	incompletives
intransitive independent		
	optatives	
trans. indep.		
dependent		

Figure 3. Epi-Olmec verb morphology, showing its agreement with the structures and categories of Mije-Sokean verbs (after Justeson and Kaufman 1996[1992]:fig. 4).

of its occurrences. Two of its other grammatical contexts are pMS and pSo *7in+, the second person (singular and plural) agreement marker, that occurs in the same contexts as *7i+, and the optative suffix (*7in ~ *7i). Identifying the sign for the syllable 7i, which is by far the most frequent clearly word-initial sign, was therefore also straightforward.

An effect of knowing some 40 word ends and 30 or so beginnings allowed us to identify grammatical alternations between spellings of -*wʉ* and *7i+* and the less common word-ending and word-beginning grammatical morphemes, respectively. In particular, this led to the identification of the signs for the syllables *na* and *pa.*

The sign **na** occurs several times, word-intially, for *na+* 'I/my' and exclusive 'we/us')—and the shift from *7i+* to *na+* in the La Mojarra narrative provided a new constraint, allowing us to identify verbs of speaking in the narrative text of the La Mojarra stela. The sign **pa**, which typically occurs word-finally, proved useful in helping to establish David Kelley's proposal for identifying an iconic element of the script with 'sky', pMS, pSo **tzap*, as this sign is followed in one instance by **pa**, consistent with its use as a phonetic complement.

Verbs in subordinate clauses begin with a subject marker. Five verbs started this way, that were not followed by –*pa* or –*wʉ* (see Figure 3), which allowed us to recognize the dependent completive marker –*ji.*

Figure 3 displays these results, showing the interlocking of these categories of verb morphology for the data from the La Mojarra text as we knew it in 1994. The tight structural conformity to Mije-Sokean grammatical structures cannot arise by coincidence.[10]

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[10] After demonstrating the detailed correspondence of epi-Olmec sign patterns with Mije-Sokean verb and noun morphology, we investigated the basic patterns of Lowland Mayan, Wastekan, and Sapotekan morphology and were unable to calibrate the textual patterns of sign use to the morphology of these groups. Here we address the most obvious discrepancies that arise for a Mayan interpretation. Mayan and Mije-Sokean both use the same morphemes to agree with the subjects of transitive verbs and the possessors of nouns. However, unlike what we find in Mije-Sokean, Mayan transitive and intransitive verbs mark aspect differently. The spellings of frequently preposed grammatical morphemes that we have identified in epi-Olmec texts would have to correspond to these markers. However, the most frequent sign in these texts, which must spell a common grammatical suffix, (a) occurs frequently at the end of a word that begins with an ergative or possessive marker, and (b) occurs most frequently at the end of a word that does not. In Greater Lowland Mayan languages, such a pattern eventually came to characterize the difference between incompletive verbs with a suffix of shape –*V:l* , which were possessed gerunds reinterpreted as predications (e.g., 'my swimming' became used for 'I am/was swimming'), and unpossessed nouns. However, this pattern does not begin to show up in Mayan hieroglyphic texts until well into the Late Classic period, about 500 years later than the La Mojarra inscription. This is inconsistent with a Mayan pattern, Lowland or otherwise.

Other lexical and word-structure constraints

The pronunciation of the sign for *ki* was identified initially from its use in spelling a sentence *jama pa..* 'the shapeshifter is *pa..*' on the Tuxtla Statuette: Chiapas Soke data shows that a special class of shape-shifting shamans (ChSo *jama*) is known as a *paki7 jama*, *paki7* meaning 'powerful'; the statuette depicts a person dressed as some kind of bird, which is a feature of the depiction of shape-shifters in other Mesoamerican traditions. This reading is verified by its productivity in several other contexts, as in the reading of a transitive verb *7i+ kip-wɨ* 'they fought them' whose subject and object are both marked with animate plural markers *+ta7m*; in other passages it serves as a phonetic complement to a logogram for the verb *wik* 'to sprinkle'.

The logogram for BLOOD is identifiable as a noun for a liquid that can also characterize the manner in which an action takes place. It is a noun because it can be possessed while not being regularly followed by a sign for an aspect suffix (though sometimes it is followed by the sign **wɨ** which spells the relativizer *+wɨ7*). It refers to a liquid because it is the subject of an intransitive verb *nɨks* meaning 'it flows/passes by', and of a mediopassive verb 'it gets sprinkled'; only a liquid is consistent with both. It is incorporated as a prefix to an intransitive verb *tɨ7p-ji* meaning 'when it set (down)', where it cannot be an incorporated object and so expresses manner; *nɨ7pin* 'blood' gets used this way in Mije-Sokean languages, while this is rare, if it occurs at all, with nouns for other liquids.

The boy-king in the La Mojarra text is quoted as saying *na+ nɨ7pin ko.wik-pa* 'my blood is (or was) getting sprinkled on behalf of others'; later, the text says *7i+ ko.wik-pa* 'he (the king) sprinkles it on behalf of others'.

Another sign represents the syllable *yaj* or the word *yaj* 'to finish (use up) something'. The reading of this sign was unavoidable based on its appearance in spelling a verb *tɨn-VERB-yaj-jay7-wɨ* 'we-and-you VERBed (him/them) for him/them', referring to an event that took place on the day of the ruler's brother-in-law was defeated, after the ruler sprinkled his own blood. The constraints are as follows.

The syllabogram **ja** appears immediately before the word-final completive suffix **wɨ** in this word; it cannot spell morpheme-final

j, because *j* (like other "weak" consonants) is only spelled before vowels. It cannot spell the end of a verb root, because all Mije-Sokean verb roots end in a consonant. Therefore, it must spell a non-final verb suffix that contains the sequence *ja*, and the only such suffix is *-jay7*, which makes a verb agree with an indirect object (instead of a direct object, if present) and makes it inflect as a transitive verb if it was otherwise intransitive. This forces us to read the beginning of this word as the ergative agreement marker *tʉn-* 'we (excl.)' (= I/we and you, not them), because a verb with *-jay7* requires an ergative agreement marker and all the other ergative markers have known, distinct spellings (**7i**, **na**, and **7i×ni**). The only inflectional suffix that can occur before *-jay7* are agreement markers for plural subjects or objects (direct or indirect), using the same morphemes as plural markers on noun phrases. The plural marker on animate (human) nouns and the agreement marker for first or second person subjects or objects is *+ta7m*; this is twice spelled **ta-ma** near the beginning of the text. The plural marker for nonhuman nouns and the agreement marker for third person subjects and objects in every Mije-Sokean language is whatever morpheme is the root of the verb 'to be finished (used up)' in that language; that the spelling in the verb *tʉn-*VERB-*yaj-jay7-wʉ* contrasts with **ta-ma** makes it likely that this is not *+ta7m*, and this is indicated independently by the fact that the noun phrase *7i+ si7i* 'their butts/buttocks' is followed by this same sign, which requires the nonanimate plural marker. The form of this word varies from language to language, but other evidence confirms that the widespread form *yaj* is its form in epi-Olmec.

In the last column of the La Mojarra text, the sign for *yaj* appears immediately after the sign **wʉ** in the verb *tʉn-*VERB-*jay7-wʉ* (a second instance of the verb just discussed, but without the optional agreement marker for third person subject or object). In this context, then, it is word-initial, and so cannot spell either a noun or a verb suffix; it must have the other function of the *yaj* morpheme, as a verb root, and must be followed by an obligatory aspect or mood suffix. It is indeed followed by one, the not very frequent optative suffix *-7i* (also attested on the Tuxtla Statuette); this sign sequence **yaj-7i** spells the verb *yaj-7i* 'it should get used.up/finished'. After the next sign, to which we return momentarily, is the verb *7i+ ko.wik-pa*, with which this discussion began.

We therefore have a sequence of three statements: 'we-and-you VERBed (him/them) for him/them; ?? should be used up; he sprinkles it elsewhere/for others'. In terms of topic continuity, the unknown sign most likely refers to what gets sprinkled; since the previous instance of the sprinkling verb has the ruler saying that 'my blood gets sprinkled elsewhere/for others', it seems likely that what is sprinkled is blood. This statement in turn immediately follows the statement that the captive brother-in-law was "VERBed" for the ruler. We infer that this blood was gotten from the ruler's captured brother-in-law. While we do not know what word is referred to by the unknown sign, its most likely pragmatic reference we take to be the captive's blood, taken for an offering. Note that the captive, or some captive, was kept alive at least for 13 days after the battle to serve as a source for the blood that was used up.

Epi-Olmec text genres

Two genres of epi-Olmec text are known. The La Mojarra stela text is a historical narrative; a series of political and military events provide the overall framework for the reported action. The complete or nearly complete epi-Olmec texts on portable objects—the Tuxtla Statuette, the O'Boyle "mask," and the Teotihuacan-style mask— are fundamentally ritual texts; it is the ritual acts themselves that provide the overall framework for the action. Even the La Mojarra text, however, is mostly devoted to recounting a series of rituals that took place, presumably connected in specific culturally understood ways with the historical events that frame its narrative.

The detailed narrative account on the La Mojarra stela (157 CE) is our single richest source. The Tuxtla Statuette text (162 CE) is quite different, laying out a process of engagement between a god and a person designed to culminate in spirit transformation. Comparative study of epi-Olmec rituals is made possible by our reading of the Early Classic text on a Teotihuacan-style stone mask (Justeson and Kaufman 2004a, 2012); this text focuses entirely on a set of three related and perhaps repeated rituals, whose characteristics overlap with those of other epi-Olmec texts. Together these three texts provide enough data to begin studying the epigraphic evidence for epi-Olmec ritual practices.
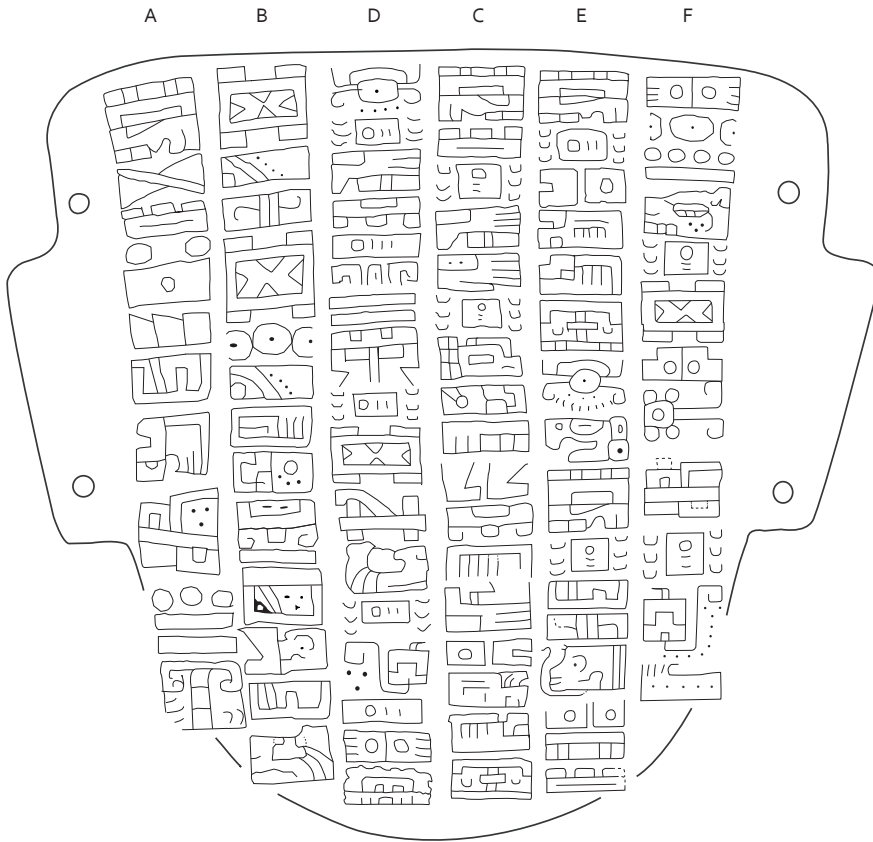
Figure 4. The epi-Olmec text on the back of a Teotihuacan style mask (original drawing by Peter Mathews, 2004), adjusted on points of detail by Justeson and Kaufman, in consultation with Justin Lowry; vector graphics and final drawing by Lowry (see also Macri 2016).

Part I: A Teotihuacan-Style Mask Bearing an epi-Olmec Text

The text on the Teotihuacan-style mask (Figure 4) is currently the second-longest in the epi-Olmec corpus—104 signs long by our count, 20 signs longer than the Tuxtla Statuette. At Teotihuacan, masks of this sort date to the Early to Middle Classic period; this, then, is the longest epi-Olmec text known from the Classic period. All other currently known Classic epi-Olmec texts are from Cerro de las Mesas, all of them short stela texts, and most of them are badly worn (see Justeson and Kaufman 2008 for discussion).

a   b   c

Figure 5. Cerro de las Mesas Stela 5 and the Chapultepec Stone: *a)* Stela 5, Cerro de las Mesas, *b)* the Chapultepec Stone, *c)* the raised panel on the Chapultepec Stone.

Origin and access

A looted object in a private collection, the place of origin of this mask is either unknown to scholars or has not been made public by any who do know it. Many such masks, of course, have been found at Teotihuacan, but several have also been found in Veracruz—and the inscribing of a Teotihuacan-style mask with an epi-Olmec inscription is a reflection of a relationship between Early Classic period epi-Olmecs and Central Mexicans that has long been documented at Cerro de las Mesas (Drucker 1943: 58, 82–86; Miller 1991; Taube 2000; Justeson and Kaufman 2008).[11]

[11] So far as we can tell, the first published statements that the inscriptions of Cerro de las Mesas were in the epi-Olmec script appear in our publications (Justeson and Kaufman 1993: 1703; 1996[1992]:13; 1997: 207). Kaufman and Justeson (2001: 2; 2004: table 44.1) noted that diagnostically epi-Olmec signs are found on Stela 6 and Stela 8 of that site. However, while not specifically noted in previous publications focusing on this writing system (e.g., Ayala 1983; Méluzin 1995), this must have been widely suspected or supposed, if only on culture-historical grounds, and the evidence for this was likely observed by others. Miller (1991: 35) specifically suggested that "The system of writing and counting was probably

This relationship is also registered in the Basin of Mexico. The "Chapultepec Stone" is iconographically a virtual copy of Stela 5 of Cerro de las Mesas (Figure 5). In his discussion of Stela 5, Stirling (1943: 35) states that the provenience of the Chapultepec Stone is unknown, but also (p. 3) that "it is supposed to have come not from the hill of Chapultepec in the Federal District, but from the village of Chapultepec [about 45km east and] south of Mexico City", and 14km south-west of Toluca.[12] Both also have a raised panel at the left, which the figure faces, and the inscriptions on these panels differ markedly. At Cerro de las Mesas, Stela 5, Stela 6, and Stela 8 have similar scenes with their single figure facing leftward toward a raised glyph panel (on Stela 8, two adjacent glyph panels). The text on Stela 5's glyph panel is badly effaced, but in 1997 Justeson recovered a complete long count date by using raking light at night; in retrospect, it is also visible in Medellín Zenil's (1971: plate 25) photographic documentation of the holdings of Xalapa's Museo de Antropología. The text on Stela 5 was no doubt a complete epi-Olmec hieroglyphic text, as on the glyph panels of Stela 6 and of the badly effaced Stela 8; and a sign is visible at A2 that seems likely to be the same as the verb logogram at A5 on Stela 6. The Chapultepec Stone, in contrast, does not bear an epi-Olmec text. Rather, it bears a sequence of glyph-like images in Teotihuacan style, imaginably either a Teotihuacano hieroglyphic text or perhaps a form of iconography adapted to an epi-Olmec display format. Stela 5 dates to 528 CE (9.4.14.1.4); this must approximate the date of the Chapultepec Stone. Monuments that occur in copies that correspond so closely are rare, but a parallel Mayan case is provided by Aguateca Stela 2 and Dos Pilas Stela 16, with similar

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continuous from Late Olmec through Early Classic times." Earlier yet, John Graham in 1970 grouped the Cerro de las Mesas texts with the Tuxtla Statuette in his UC Berkeley seminar on non-Mayan writing systems of Mesoamerica, in which Justeson as a participant focused on this group. More generally, an Olmec heritage in the sculptural tradition was pointed to by Coe (1962: 118–119), who stated that "A number of stelae encountered there [...] show features recalling both the Olmec and Izapan styles. [...] The Olmec were-jaguar appears in mask-like headdresses [....] Other sculptures include a monstrous figure of a duck-billed human closely resembling the Tuxtla Statuette, which itself was found not far from Cerro de las Mesas." Similarly, Willey (1991: 199) considered the art of Cerro de las Mesas—"sometimes described as 'Olmecoid' or 'epi-Olmec'"—as having a regionally distinctive style "with 'Olmec residues'".

[12] Justeson and Kaufman (2008: n. 11) incorrectly fill in "[San Miguel]", the district of Mexico City bordering Chapultepec park.

iconography, and the same series of dated events, phrased very similarly, up to the part of the Dos Pilas text that has been lost.

Daneels (2004) identified and analyzed sixteen Teotihuacan-style masks that have been recovered archaeologically in Veracruz, and discussed this corpus in terms of the masks' materials, dimensions, design features, and (where known) archaeological associations. Matthew Robb (personal communication, 2012), who has studied both the Teotihuacan and Veracruz corpora in detail, considers it to agree stylistically with Teotihuacan-style masks found in Veracruz more than with those found at Teotihuacan.[13]

Houston and Coe do not report its dimensions, but judging from Houston's schematic drawing (Houston and Coe 2003: fig. 1),[14] it is about 17.3cm wide and 18.9cm high. Inasmuch as the back of the mask was carved out to fit a human face, these dimensions are close to those of the only such mask found archaeologically in Veracruz whose back was also carved out to fit a human face, at 17.5x20.0cm (Daneels 2004: 406). We do not have data on these dimensions for masks from Teotihuacan, but we suppose that the dimensions of those designed to fit a human face would be similar. Two other Teotihuacan-style masks found in Veracruz have similar dimensions (one from Cueva Huayateno at 17.7x17.2cm, and one of unknown provenance at 20.2x18.4cm).

To our knowledge, no such masks have been found in or around Chiapa de Corzo, so if it is from epi-Olmec country it is more likely from in or near the Papaloapan Basin. It could relate to Cerro de las Mesas specifically—the only Classic period site known to have epi-Olmec texts—and otherwise most likely to Teotihuacan.

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[13] The discovery of a Teotihuacan-style mask near Arroyo Pesquero might suggest continuing or renewed elite-level activity there, but Daneels (2004: 407, 410) argues that this object was likely deposited in the Late Classic.

Houston and Coe (2003: 156) argue that the mask under analysis is likely from Veracruz on the grounds that, unlike most such masks from Teotihuacan, the back is not flat but rather is thinned out to fit onto a human face. However, Daneels (2004: fig. 12) reports that most of the nineteen Teotihuacan-style masks from Veracruz also have flat backs and, while several were slightly curved, only one (that recovered from Arroyo Pesquero) was carved out to fit a human face.

[14] The profile and face views of the published drawing, by Houston, are not consistent with one another. The distance from the top to the bottom is larger in the profile view. Aligning the two drawings with the perforations at the lower left "ear", the point of chin is aligned but the eyes, the nose, the upper lips, the upper edges of the "ear" flanges and the top of the forehead are all higher in the profile view than in the side view.

a   b

Figure 6. Stela 15 of Cerro de las Mesas, recording the dates 1 Dog (the third of the five "name-less" days ending the year) and 4 Reed (the name of the new year) (photographs by Herbert J. Spinden, courtesy of the Haffenreffer Museum of Anthropology, Brown University).

Epigraphically, we have argued (Justeson and Kaufman 2008: 183-184) that Cerro de las Mesas Stela 15 (Figure 6), whose iconography seems purely Teotihuacanoid (cf. Stirling 1943: 44; Miller 1991: 31; Taube 2000: 44), is a new-year monument for the epi-Olmec year 4 Reed, a day name recorded on Stela 15; year-ending activities seem to have been performed 3 days earlier, on the day 1 Dog on the 3rd of the five "nameless" days ending the year, which is recorded both on Stela 6 and Stela 15; on Stela 15, the two occur in sequence—1 Dog (day 363 of the old year) followed by 4 Reed (day 1 of the new year).

To anticipate some aspects of our conclusions: Whatever its source, the text on this mask seems to be purely epi-Olmec: it was written in the epi-Olmec language, thematically parallels the content of other epi-Olmec texts, is structured chronologically in terms of a distinctively epi-Olmec astronomical cycle, and agrees with the texts on the La Mojarra stela and the Tuxtla Statuette in

attesting consistencies in the conduct of similar types of rituals, and systematic differences in the conduct of different types of rituals.

The existence of this mask and its text became widely known in the summer of 2002, having been reported by Houston to several European colleagues. We learned of it in August of that year, and in the same month we received a copy of David Joralemon's preliminary drawing of it.[15] As of this writing, full coverage photographs of the text are still not publicly available and we have had no access to any such resources that may exist. However, in fall 2003, upon our inviting Joralemon and Michael Coe to take half of our time at the Dumbarton Oaks conference on Classic Veracruz to present a discussion of this text, Coe provided us with three of his own high-resolution photographs of parts of it; these photographs were subsequently posted online.

Coe's photographs show that the published drawing (Houston and Coe 2003: fig. 2) is inaccurate in several respects, but few of these errors affect our analysis. Our Figure 4 provides a different perspective on the text (see also Macri 2016). Because of the curvature of the surface on which the glyphs are inscribed, and because Joralemon's and Houston's drawings reflect an angle of view of the object as a whole, their drawings distort the forms of the individual signs in the text as they would have been seen by a reader scanning through them sign by sign; there are also errors in the published drawings on details of some signs.

To provide a more accurate representation of the individual signs, we asked Peter Mathews to redraw the text for us, with each sign at approximately the orientation it would have for a reader; the overall presentation in Figure 4 is due to Mathews. The final version is largely due to Justin Lowry, who created a vector representation from Mathews' drawing, after which he touched up details of every sign based on Coe's photographs, in consultation with us. The

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[15] In August of 2002, we received a copy of Joralemon's preliminary drawing from George Stuart, whose practice was to distribute drawings and photographs of primary data to active researchers. We immediately contacted Joralemon asking to examine the text or photographs of it; we were told that decisions on who would have access would be resolved on October 1, and that we should contact him then. As of that date we were denied access to it; at that time, we discontinued our work with the text pending its public release. We advised Stuart that parties unknown to us were limiting access to it, and that we were suspending work on its analysis until such time as it was made publicly available, when we would acknowledge his having provided us access to the text; Stuart approved this course of action.

drawing published here is based on Coe's photographs for all features that are clearly discernable in them, but relies on Joralemon's and Houston's drawings for other details.

We also correct Houston and Coe's labelling of columns C and D to conform to standard Mesoamericanist practice: labels attached to columns that are read in reverse order standardly reflect the order of reading, not their left-to-right sequence.

Overall text structure

The inscription consists of six columns of glyphs. Initially, the text can be broken down into three discrete text segments, each consisting of an adjacent pair of columns.

The faces of signs depicting humans and animals, and the fronts of each recognized epi-Olmec sign, are at the left in columns A-B and E-F, which the La Mojarra text shows is the orientation of epi-Olmec signs read left to right (cf. Macri and L. Stark 1991: 26–27). In columns C-D these features are at the right, which is the orientation of epi-Olmec signs read right to left. The reversed order of columns C and D is confirmed by the fact that a sign sequence at E3-E7 is repeated, sign for sign, starting in C14-C17 and ending at D1. This position on the reading order within each pair of columns is obvious and uncontroversial; Houston and Coe (2003: 157–158), and Joralemon before them, reached the same conclusions, citing the same evidence.[16]

While the reading order within the second of these three segments is reversed, it can be shown that the *pairs* of columns are themselves to be read in left-to-right order: columns A-B, then columns C-D, then columns E-F. This is the only straightforward order of reading, and it would take compelling evidence to adopt any other.[17]

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[16] Note, however, that one sign, unique to this text, has opposite orientations at B3 and E12, even though both of these columns otherwise have the standard orientation of columns that are read from left to right. Several examples of this sort of error on reversal of orientation are noted by Macri and L. Stark (1991: 26–27).

[17] Houston and Coe (2003: 158) speculate as follows about the order of reading on the mask:
"Our hunch is that the text began, much like the La Mojarra text, in the middle, so that E1 may have been the first glyph in the text. We do not pretend to understand the content of the inscription, but it is noteworthy that this first cluster has what appears to be a '9' (F3), the next cluster (Columns D and C) a '10' (C7), and the final cluster (Columns B and A) a '13' (A10). This sequence may be telling us something about the order of paired columns."

The default reading order in epi-Olmec texts is from left to right, with signs facing leftward, as in Mayan and Sapoteko writing. The text on the front of the La Mojarra stela is the only known epi-Olmec text besides that on the mask on which some text segments have different orientations than others. There, columns A–L, on the left side of the stela face, appear above the carved figure and are oriented rightward like the figure itself; the same correlation is found in the texts of Monte Alban (Kaufman and Justeson 1993–2015), and a similar correlation is typical of Egyptian texts (see especially Fischer 1977). The glyphs in columns M to U, on the right of the stela's face, show the standard/default leftward orientation. The overall visual effect is that the figure and text on the left of the stela face toward the text on the right, and the text on the right faces toward the text and figure on the left. The two text segments show the standard left-to-right reading order: that is, the text segment formed by columns A to L is read before the text segment of columns M to U. Accordingly, the expected reading order of the three 2-column text segments on the mask is in pairs of columns from left to right.

First, there are three text segments, of two columns each; if the text literally began "in the middle", it is the segment consisting of columns C and D that would be read first, not the segment beginning with column E. What they effectively argue for, based on a supposed pattern of increasing numerals, is that the three segments are read from rightmost to leftmost.

In principle, this "hunch" was not worth reporting. With only three numerals at issue, ⅓ of the arrangements—9, 10, 13 and 13, 10, 9—would show a consistently increasing or decreasing order, so such an order consistency would not be evidence of anything. Furthermore, they fail to mention the numeral 5 at B10, although they include it in their own transcription of the text. With this numeral included in their list, the sequence would be 9, 10, 13, 5 in the reading order they suggest, or 13, 5, 10, 9 in its actual reading order. With four numerals to place, and either order of reading available, there are 24 possible sequences and 20 of them have at most one out of order.

The stated basis for this speculation is astonishing coming from scholars with experience in Mesoamerican epigraphy: they do not mention—and given their argument about increasing order, they do not seem to recognize—that every one of these numerals is part of a day name. The numeral 10 at D7 (Houston and Coe's mislabelled "C7") appears immediately before what is unmistakably the sign for the day House in the form it has on the monuments of Xochicalco (e.g., as year names on Stela 2 and Stela 3); the numeral 10 is therefore a trecena numeral, part of the name of one of 260 days in the divinatory calendar. The only way that this numeral would necessarily be part of an increasing sequence of three would be if all of the days being named were from a single trecena—in this case, 9 Wind (inconsistent with the animal head represented at F4), 10 House, and 13 Death. Houston and Coe do not address this issue.

The other two numerals that Houston and Coe point to are also followed by signs identifiable with epi-Olmec day signs.

Our analysis of the chronology supports this reading order. The sequence of four dates in the mask text, when the text segments are read in the straightforward sequence, proceed forward through ritually significant dates in three successive Venus years within a specifically epi-Olmec calendrical or astronomical cycle, the circumnodal Venus cycle (discussed in the introduction).

The order of the second (CD) and third (EF) segments is especially obvious. The day 10 House at D7–8 falls $64+260n$ days (where n is some non-negative integer) before 9 Deer[18] at F3–4—which, given the evidence for a Venus chronology in the monuments at Chiapa de Corzo, La Mojarra, and Cerro de las Mesas, we take to be specifically one canonical Venus cycle of 584 (=$64+2×260$) days. This canonical interval is found recurrently in the Dresden and Borgia group Venus tables; in the latter, its explicit representation is via an interval of 64 days. This interval requires that columns C–D are read before columns E–F.

The discussion of the CNVC cycle above notes that Venus anniversaries are counted using a fixed 584-day canonical cycle from the base dates of the CNVC. The format of the mask's text suggests that the base date would be in the first segment, 584 days earlier than 10 House—hence on 11 Storm. The day name 11 Storm is not recorded, but 5 Sun[19] is recorded at B10–11 (as transcribed but not understood by Houston and Coe). A day name 'sun', or including the word for 'sun', is found in the Basin of Mexico, in the conservative Metz-

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[18] The basic features of the sign at F4 following the numeral 9 at F3 is an animal head identifiable with the day Deer based on its protruding tongue, found in examples from Highland Mexican codices and in the day name Deer on the La Mojarra Stela; and the sign after numeral 13 at A11 compare with those of the sign for the day Flint on Tres Zapotes Stela C (cf. Justeson and Kaufman 2008: fig. 6) more closely than either does with any other Mesoamerican day sign.

[19] The numeral 5 at B10—not mentioned in Houston and Coe's argument though appearing in their transliteration, and which is inconsistent with their argument for reading order—is followed by the sign that we are forced to read as a logogram for the word *sɨw* 'sun' in the solar eclipse statement of the La Mojarra stela (see note 3). Words with this meaning name the 16th day, or are part of it, in Metztitlan Nawa, in Matlatzinca, and in Otomi—all in the Basin of Mexico (Kaufman 1988–2017: 64–66). Gulf Coast Nawa forms of this day name, both as *tunal* and *tunal-li*, were adopted in Ch'olti7 in personal names (Justeson 2018). The pre-Columbian adoption of Nawa days names in personal names was clearly of pre-Columbian origin in Yokot'an, given the earliness of their; and in both Ch'olti7 and Yokot'an, all Nawa day names whose Gulf Coast Nawa pronunciation differs from that in Nawa of central Mexico appear in their Gulf Coast Nawa form: these are *kuwa* ('snake') for day 5, *selu(-t)* ('jaguar') for day 14, *tunal(-li)* ('day') for day 16, and *xuchi(-t)* ('flower') for day 20.

titlan Nawa day name list, as well as in Matlatzinca and Otomi. It is also found in the Gulf Coast Nawa day names *tunal* and *tunal-li* that appear in Lakantun Ch'olti7 personal names (Justeson 2018). The date 5 Sun falls 137 days after 11 Storm, consistent with the second station known from other epi-Olmec texts. Its presence accords with the inference that 11 Storm was a CNVC base date.

The calendrics of the mask text therefore provide direct chronological evidence for the obvious reading order of the text—suggesting (a) that columns A–B pertain to a Venus year beginning on 11 Storm, (b) that columns C–D pertain to the next Venus year, beginning 584 days later, and (c) that columns E–F pertain to the Venus year after that, beginning another 584 days later. The fact that each of the three pairs of columns deals with events within each of three successive Venus cycles raises the possibility that the text concerns a complete CNVC cycle, one that was three Venus years long; this is the complete length of 53% (⁸⁄₁₅) of CNVC cycles.

In the process of reading the text, after finishing columns A and B a reader must skip over column D to reach column C, change to a leftward direction of reading from the top of column C through the bottom of column D, and then once again skip over column D to reach column E. Thereby, the reader actively engages each pair of columns, A–B, C–D, and E–F, as separate subparts of the overall text. That each pair of columns constitutes a discrete textual unit is also supported by the fact that all three begin with the same fused sign pair, also noted by Joralemon and by Houston and Coe. We will see that each pair of columns contributes, as a distinct component, to the structure of the text as a whole. The way that they do so also progresses through each cycle: initially, focusing on preparations, and thereafter shifting the focus onto sacrificial events.

The evidence that the segments of this text are timed calendrically, in terms of the Venus cycle, raises the testable possibility that the unrecorded date 11 Storm was the base of a CNVC. This we can confirm.

Archaeologically, masks of this style are known to have been produced in the Tlamililolpa and Xolalpan phases at Teotihuacan (c. 200–600 CE); George Cowgill (personal communication, 2004) suggests that they may have been produced as late as the Metepec phase

(600–650). To avoid being overly restrictive, we explore possible chronological placements in the broader range from 1 CE to 800 CE.

1. The four known CNVC base dates are all within 10 days of a total eclipse, lunar or solar, or of an annular solar eclipse (which would fall in the same range of divinatory calendar dates as total solar eclipses). This is an effect of their falling very near a node, which in turn is part of the commensuration of eclipses with the divinatory calendar (for a detailed exposition of the relevant properties, see Justeson 2017). It is not the case that all of these eclipses were visible locally; the CNVC pattern relates to eclipse-timing commensuration, not observation.

2. Each of these four bases falls within 12 days of the maximum elongation of Venus.

3. For the two dates at the second CNVC station, about 134 days after the base, the actual base is unknown, but in both cases the date of a total eclipse and that of maximum elongation of Venus are close enough that the base could fall within the same range as for the established bases.

We address the date(s) on which the mask might have functioned with broader limits than the 200–650 CE range: results reported here are for 11 Storm dates in the epi-Olmec calendar between 1 and 800 CE within 9 days of a total eclipse and within12 days of maximum elongation of Venus as evening star.

Table 3 displays seven 11 Storm dates between 290 and 602 CE whose CNVC cycle lasts exactly three Venus cycles and that are within or close to specified limits of a total eclipse and of the maximum elongation of Venus as evening star. One, in the year 511, falls 11 rather than 10 days from the nearest total eclipse; the rest all fall within 5 days. All are within 7 days of the maximum elongation of Venus as evening star. Three pairs of these dates, each pair enclosed in a single box in the chart, are separated by 13×360 days, so that they fall on the same day of the divinatory calendar (13×360=18×260) and 8 days past the same day in the canonical Venus cycle (13×360=8×584+8). It is imaginable that the text was intended to be applicable for more than one of these dates.

cycle length	Venus cycle #	11 Storm					Julian date	maximum elong.	total eclipse date & type
3VY	46	8	12	12	6	19	290 May 24	290 May 29 2am	sol 290 May 25 6:18pm
3VY	54	8	13	5	6	29	303 Mar 17	303 Mar 14 6pm	lun 303 Mar 19 5:46pm
3VY	46	8	17	17	14	19	394 Apr 28	394 Apr 28 11am	lun 394 May 2 12:58am
3VY	54	8	18	10	14	19	407 Feb 19	407 Feb 12 1am	ann 407 Feb 23 8:11pm
3VY	46	9	3	3	4	19	498 Apr 2	498 Mar 28 11pm	ann 498 Apr 7 12:56pm
3VY	54	9	3	16	4	19	511 Jan 24	511 Jan 12 5am	sol 511 Jan 15 10:00am
3VY	46	9	8	8	12	19	602 Mar 2	602 Feb 26 8am	sol 602 Feb 27 2:35pm
5VY	30	9	12	8	2	19	680 Jun 23	680 Jun 26 9pm	lun 680 Jun 17 5:37pm
5VY	30	9	17	13	10	19	784 May 28	784 May 26 9pm	sol 784 May 23 3:59pm
8VY	38	9	2	10	4	19	485 Jun 9	485 Jun 12 11am	sol 485 May 29 1:35pm
8VY	38	9	7	15	12	19	589 May 14	589 May 12 3pm	lun 589 May 5 8:27pm

Table 3. 11 Storm dates between 1 and 800 CE, that are close to maximum elongation of Venus as evening star and to a total eclipse station. Cycle length refers to the number of Venus years from the candidate CNVC base to the next CNVC base.

Two other dates, bases of CNVC cycles lasting five Venus years, fall within the attested limits from a total eclipse and from the maximum elongation of Venus as evening star. Both are outside the 200–650 CE range. We do not dismiss the 680 CE date as impossible in principle, but the 784 CE candidate does seem implausibly late.

The last two candidates are bases of a CNVC cycle that would last for 8 Venus years. The earlier of the two falls within the range of the three secure epi-Olmec long count dates at Cerro de las Mesas, and the last is only 56 years later than that of Stela 8. Both fall within the attested limits from a total eclipse and from maximum elongation of the evening star.

A few other candidates could be entertained if the calibration to the internodal cycle were loosened to admit dates further from eclipse dates; they would be near eclipses that were not total or annular.

Finally, it is noteworthy that two of the eleven known epi-Olmec texts have segments that are read right to left. While exceedingly rare in Mayan, this is a common minority pattern in Sapoteko hieroglyphic texts, especially in the Preclassic period; in particular when adjacent to (above, or immediately to the right of) figures that are facing rightward; and in multi-column Sapoteko texts, it is typical that other columns have the default left-facing orientation. This
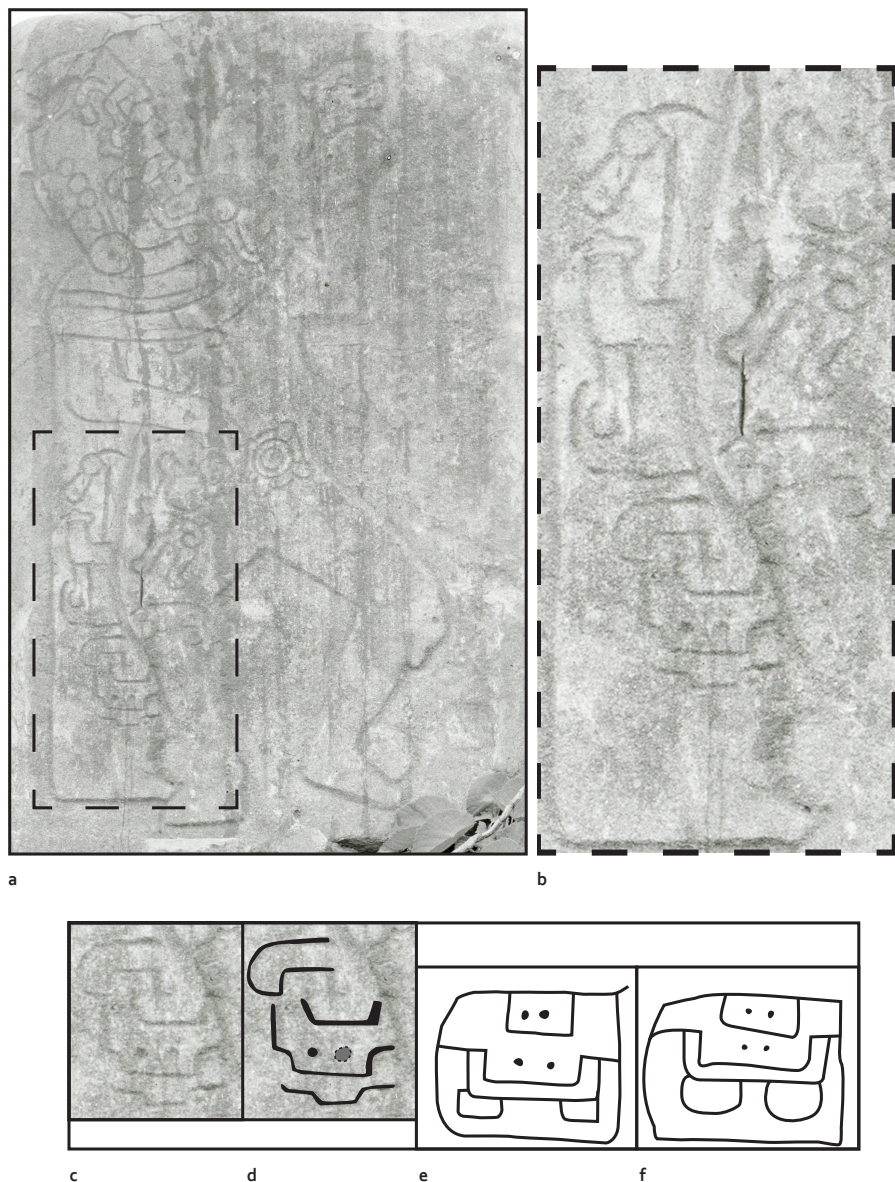
Figure 7. Monte Alban Mound J Tablet 41 (J-41): *a)* Tablet J-41, *b)* detail of inside of cloak, showing the hill icon with vegetal sprouts, and glyph underneath, *c)* the hieroglyph below the hill sign, on the figure's cape, *d)* details drawn in, *e)* the logogram (APPEAR) at R2 on the La Mojarra stela, *f)* the same logogram at O12 on the stela (photograph by Herbert J. Spinden, courtesy of the Haffenreffer Museum of Anthropology; drawing by Justin Lowry).

practice may have diffused between the two groups. We know at least that the Sapoteko composers of some Monte Alban texts were familiar with epi-Olmec writing around 100 CE. Bernal (1968: 220, 1969: 163) noted Olmec-style facial features and ornamentation on many of Mound J's "conquest tablets", referring particularly to the inverted heads below the HILL logograms. On the cloak of a figure on Mound J's Tablet 41, what is inscribed below the hill glyph instead of an inverted face is an epi-Olmec logogram (see Figure 7).

Other facets of contact between epi-Olmecs and Oaxaca are documented by 100 BCE, when vessels from Oaxaca are found in the epi-Olmec tomb 7 at Chiapa de Corzo (Lowe and Agrinier 1960: 49) dating to 100 BCE (Clark 2017: 271; personal communication, 2018).

Methods used to analyze the text

Before this text became known in 2002, based on the then-known epi-Olmec texts, we had published readings for 38 of the signs that occur in it (Kaufman and Justeson 2001), amounting to 70% of its signs in terms of text frequency. Using the known values for these signs, a knowledge of epi-Olmec grammar (Kaufman and Justeson 2004a), and a knowledge of Sokean vocabulary,[20] it is possible to parse the mask text and to understand much of its content. All of our earlier readings prove consistent with their new contexts in the mask text; for some, the new contexts strongly support their previously proposed readings.

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[20] Our chief source for Sokean vocabulary are the lexical databases created by linguists working on the Project for the Documentation of the Languages of Mesoamerica, which we initiated in 1993 in order to document lexically all the languages of the Mije-Sokean family, both because they are seriously endangered and because an expansion in the lexical and grammatical resources on this language was our primary means of advancing decipherment work on the epi-Olmec script (cf. Justeson and Kaufman 1993: 1710). The documentation work of this project, which expanded from its initial coverage to include other Mesoamerican language families, was completed in 2010; dictionaries of four Sokean languages (colonial Tecpatán Chiapas Soke [Zavala in press], Ayapanec Gulf Sokean [Suslak in press], Santa María Chimalapa Soke [Kaufman in press a], and San Miguel Chimalapa Soke [Kaufman in press b]) have been in production since 2014, and we are now in the process of bringing out dictionaries and grammatical sketches of the other Mije-Sokean languages whose documentation we conducted or supervised. Around 1990, Søren Wichmann provided us with a pre-publication version of his compilation of Mije-Sokean cognate sets (later appearing in Wichmann 1995) which was a significant aid to our research into the mid 1990s.
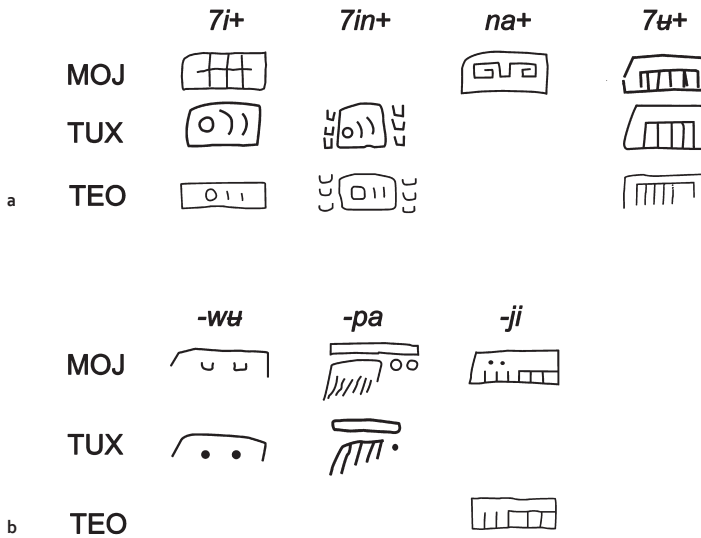
Figure 8. Signs and sign groups useful for grammatical analysis. The pictured signs spell epi-Olmec syllables whose occurrence typically corresponds to inflectional morphemes of obligatory categories. Note that each sign spells a syllable, not a morpheme; almost all are attested, though less often, in phonetic spellings of other parts of some epi-Olmec words. For example, the sign for *na* occurs in spelling the beginning of the word *nas-wʉ-* '(it/they) passed' on the La Mojarra stela. *a)* Spellings for syllables instantiating ergative proclitics {7i+} '3rd person'; {7in+} '2nd person' [spelled 7i×ni]; {na+} '1st person exclusive'; and absolutive proclitic {7ʉ+} '1st person exclusive', *b)* Spellings for syllables instantiating aspect suffixes: {-wʉ} 'independent completive'; {-pa} independent incompletive; {-ji} dependent completive.

The nineteen signs for which we did not previously have readings are known only from this text. Eighteen of these signs are adjacent to a sign of known value, and thirteen are both immediately preceded and immediately followed by a sign of known value. The constraints thereby provided by the known signs enable us to establish a series of results.

Our inference methods, as in our previous work, are as follows:

1. Sokean languages have rich morphology, which will be reflected in obvious ways in almost any text with more than one or two sentences. We identify grammatical constraints that the known signs provide for a reading of the text, by locating known spellings for grammatically-required morphemes. For verbs, this means identifying spellings for proclitic pronominal agreement markers—that is, words preposed to the verb word that indi-

cate the grammatical person of subjects and objects (see Figure 8a). ("Proclitic" in Mije-Sokean means that these elements are themselves separate words, not "prefixes", and that they attach to the verb word after accent rules have been applied to it.) There are two categories of person markers on verbs: "ergative", which agree in person with the subjects of all verbs in subordinate clauses, and of transitive verbs in main clauses; and "absolutive", which agree in person with the subjects of intransitive verbs in main clauses and with the objects of transitive verbs regardless of clause type. The required grammatical suffixes on verbs mark aspect and mood, and are deployed depending upon whether the verb is in an independent (or "main") or in a dependent (or "subordinate") clause (Figure 8b). On nouns, the ergative proclitics serve as possessive markers, and the absolutives as subjects of predicate nouns or adjectives (like "I am your father" and "Life is short").

The fact that every verb obligatorily ends in a marker of aspect or mood, while nouns (and noun phrases) and predicate adjectives need not have any suffix, helps us to distinguish the grammatical class of epi-Olmec words.

For more detail, see the general discussion of our linguistic framework for analysis above.

2. Dates and other adverbial terms (which are mostly temporal locators) occur at the beginning of the sentences in which they occur in epi-Olmec and in Mije-Sokean languages. We therefore use day names and logograms that represent adverbs to identify (some) sentence boundaries.

3. When (a) the end of the pronunciation of one sign is inconsistent with the beginning of the pronunciation of the next, given epi-Olmec spelling conventions, and (b) one of these signs is a logogram, this allows us to place a morpheme (grammatical) boundary between them.

Figure 9 presents the results of applying these constraints to breaking down the mask text; the 104 signs of the text are separated into 63 individual morphemes or multi-morphemic sequences. Such extensive analytic breakdown of the text is promising for analysis.
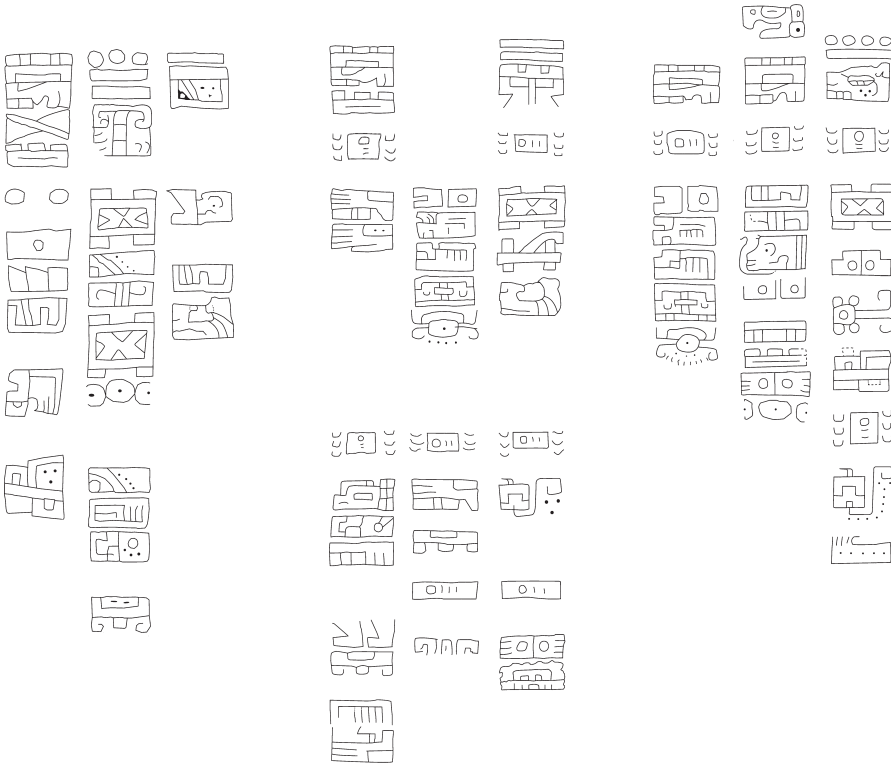
Figure 9. Preliminary identification of morpheme boundaries in the mask text, prior to syntactic analysis or the reading of new signs, arranged to display grammatical and lexical parallels across text segments. Note that, on the mask, the orientation of signs in the middle segment was reversed (except for the sign **7i₂**); we have "re-reversed" them to enhance comparability across segments.

4.　We apply all these results to identifying vocabulary. Using grammatical constraints, we identify word and phrase boundaries. The ergative/possessive markers, for example, show us where eleven words on the mask begin. These results also help us to identify parts of speech: it is usually possible to determine whether a word is a transitive verb, an intransitive verb, a possessed noun, or a non-verb (a noun, an adjective, or an adverbial); for nouns marked as plural, we can know whether that noun is grammatically "animate" (human or divine), since the former are marked by the postposed clitic (= "enclitic") *+ta7m* and the latter by *+yaj*. When a phonetic sign is part of the spelling of a word, we look for reconstructible Sokean words

> that meet all these constraints—grammatical, phonological, and semantic.

These phonetic and grammatical constraints allow us to determine probable or unavoidable values for about half of the newly encountered signs; for the rest, viable readings can be proposed but not established. Examples of the some of the issues are given following a transcription of the text into the epi-Olmec language, and a rough and tentative translation of it.

Reading and translation

We write epi-Olmec and other Mije-Sokean words in a practical, Spanish-based orthography. Most letters and digraphs have their usual Spanish pronunciations, but *j* is pronounced like English *h*, *7* represents a glottal stop, and *tz* represents a sibilant affricate [¢], which sounds like *ts*. The letter *ʉ*, or "barred *u*", represents a high, central-to-back unrounded vowel; it sounds like the *u* of *put* and *bush*, as pronounced by some Southerners and Westerners in the US, and like the *u* in *just now*. In representing the grammatical structure of words, = joins the members of a compound, - joins inflectional affixes to stems, . (a dot) joins derivational affixes to stems, and + joins clitics to words (clitics are words that do not carry an accent). Accent falls on the next to last syllable of a word, not counting clitics.

Our text transliterations below present the results of our analysis; full transliterations, including sign values, analysis of word structures, and both literal and free translations, are provided in the appendix. The following codes are used to label grammatical morphemes in our analysis of the mask text:

AN	active nominalization	**1E**	first person ergative
PN	passive nominalization	**2E**	second person ergative
NSTR	instrument nominalization	**3E**	third person ergative
NTP	antipassive voice	**1A**	first person absolutive
II	independent incompletive status	**2A**	second person absolutive
IC	independent completive status	**3A**	third person absolutive

SEGMENT 1
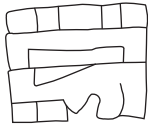
A1a	MIDDLE	
A1b	"INVERTED.JAWBONE":	
	a place or type of place	

A2	"TWIST": ?TWIST/**WI7T**	
	(maybe ?FLAY/**TZIK**)	
OR	TINY/**NAM**	

A3	"BAG": SKIN$_2$/**NAKA**$_2$	
OR	NIGHT/**TZU7**	

A1-A3:

T	MIDDLE/**KUK**	"PLACE"	?TWIST/**WI7T**	SKIN$_2$/**NAKA**$_2$
R	kuk	??	?wi7t.i	nak
G	middle	"place"	twist-PN	skin
LT	middle	"place"	twisted	skin

OR
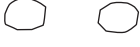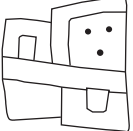
T	MIDDLE/**KUK**	"PLACE"	?FLAY/**TZIK**	SKIN$_2$/**NAKA**$_2$
R	kuk	??	?tzik.i	nak
G	middle	"place"	flay-PN	skin
LT	middle	"place"	flayed	skin

OR

A1-A3:

T	MIDDLE/**KUK**	"PLACE"	TINY/**NAM**-NIGHT/**TZU7**
R	kuk	??	nam=tzu7
G	middle	"place"	little-night
LT	middle	"place"	before dawn

	A4	TWO/**WᵾS=TᵾK**
	A5	BLOOD/**Nᵾ7PIN**
	A6 OR	"TANG": SOAK/**SO7M** **so** or **ka**
	A7	**ma**
	A8	**7aw**
	A9	DO/**TZᵾK**

A4-A9

T	TWO	BLOOD-SOAK-**ma**	**7aw**-DO
R	wᵾs=tᵾk	nᵾ7pin=so7m.a7	0-7aw=tzᵾk.i
G	two	blood-soak-AN	3A-before-make-PN
LT	two	blood-soak-er-s	they-are-prepared-in-advance

OR

A4-A9

T	TWO	BLOOD-**ka**-**ma**	**7aw**-DO
R	wᵾs=tᵾk	nᵾ7pin=kam	0-7aw=tzᵾk.i
G	two	blood-hard	3A-before-make-PN
LT	two	blood-hard-things	they-are-prepared-in-advance
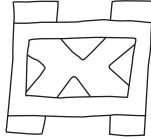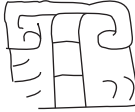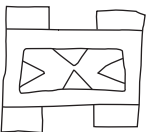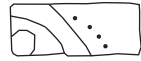
kuk 7it.i7, wi7t.i/tzik.i naka, wᵾs=tᵾk nᵾ7pin=so7m.a7 7aw=tzᵾk.i.

FT   In the middle of the place, twisted (or flayed) skin and
         two blood-soakers have been prepared in advance.

OR

kuk 7it.i7, nam=tzu7, wᵾs=tᵾk nᵾ7pin=so7m.a7 7aw=tzᵾk.i.

FT   In the middle of the place, before dawn, two blood-soakers have
         been prepared in advance.

A10 THIRTEEN/
    MAK-KO-TUKU

B4   **pɨk**

A11 FLINT/
    ?JUKUTɨ TZA7

B5   **wɨ**₃

B6   **kɨ**

B1   **pɨk**

B7   "RECTANGLE"₁:
COTTON/**TZOJA7** or **tzo**

B8   **ja**

B2   **kɨ**

B9a   **tu**
B9b   CLOTH/**TUKU7**

B3   **pa**₃

A10-B9:

T	THIRTEEN			DAYNAME-"FLINT"	
R	mak	ko	tukɨ	?jukutɨ	?tza7
G	ten	plus	three	?fire	?stone
LT	thirteen			?fint	
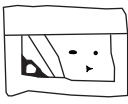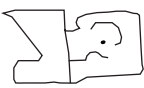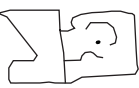
T	**pɨk-kɨ-pa**₃
R	0-pɨk(=kɨw7)-pa
G	3A-take(-dye)-II
LT	it-gets-taken(-and-dyed)

T	**pɨk-wɨ**₃		**kɨ**	COTTON-**ja**	**tu** CLOTH
OR					
T	**pɨk-wɨ**₃		**kɨ**	**tzo-ja**	**tu** CLOTH
R	pɨk	+wɨ7	kɨ7	tzoja7	tuku7
G	fur	+REL	hand	cotton	cloth
LT	furry		forepaw	cotton	cloth/garment

FT   On 13 "Flint", (a) furry forepaw(s) and a cotton cloth/garment
      (will) get taken (and dyed).

note: A word for 'flint' is likely the original name for this day, but we have
no data on what its Sokean name was; 'flint' is *jukutɨ tza7* (lit., "fire stone").

	B10	FIVE/**MOS**
	B11	SUN/**SꞮW**
	B12a	"BOOT": ?RULER/**7AW**=**KI7M>7OY.E7**
	B12b	"FACE"₂: ?PERSONAGE
	B13	**ma**
	B14	CAPTIVE/**MATZ**(**.E**)

B10–B14:

T	FIVE	SUN
R	mos	sꞮw
G	five	sun
LT	5 Sun	

T	?RULER	"FACE"₂	**ma**-CAPTIVE/**MATZ.E**
R	?7aw=ki7m>7oy.e7	?win	0-matz.e
G	before=go.up>NTP-AN	personage	3A-seize.PN
LT	ruler	personage	he-is-captive

FT   On 5 Sun a ?"rulerly" ?personage is/will.be a captive.

note: "Rulerly" is a shorthand way to refer to some specific social status, presumably a relatively high one.

SEGMENT 2
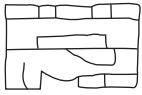
C1a MIDDLE/**KUK**
C1b "INVERTED.JAWBONE":
     a place or type of place

C2 "BAG": SKIN$_2$/**NAKA**$_2$
    OR NIGHT/**TZU7**

C3a **7i**$_2$
C3b **ni**$_2$
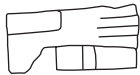
C4 **ne**

C5 "INVERTED.HAND":
    ?COVER/**NEK7**

C6a **7i**$_2$
C6b **ni**$_2$

C7 **ki**

C8 RECTANGLE2:
    ?SHINE$_2$/**KIJ**$_2$

C9 **ji**

C10 "2.BOOTS":
     ?RULER/
     7AW=KI7M>7OY.E7

C11a **tu**
C11b CLOTH/
      TUKU7

C1-C5:

T	MIDDLE/**KUK**	"PLACE"	SKIN$_2$/**NAKA**$_2$	**7i**$_2$-**ni**$_2$-**ne**-?COVER
R	kuk	??	naka	0-7in+?nek7.a7
G	middle	"place"	skin	3A-2E-?protective.cover-AN
LT	middle	of the "place" skin		(it-is-)your-?protective.covering

OR

T	MIDDLE/**KUK**	"PLACE"	NIGHT/**TZU7**	**7i**$_2$-**ni**$_2$-**ne**-?COVER/**NEK7**
R	kuk	??	tzu7	(0-)7in+?nek7.a7
G	middle	"place"	night	(3A-)2E-?protective.cover-AN
LT	middle	of the "place"	night	(it-is-)your-?protective.covering

C6-11:

T	**7i**$_2$-**ni**$_2$-**ki**-?SHINE$_2$-**ji**	
R	7in+?kij.i	
G	2E-?shine-PN	
LT	your-?shining-thing	

T	?RULER	**tu**-CLOTH
R	(0-)?7aw=ki7m>7oy.e7	tuku7
G	(3A-)before-go.up-NTP-AN	cloth
LT	(it-is-)"rulerly"	cloth/garment

C1-C11:

FT   In the middle of the place a skin is your ?protective covering;
       your shining thing is a "rulerly" garment.

  OR

     In the middle of the place, at night, your shining "rulerly" garment
       is your ?protective covering.

	C12	**?7ʉ**
	C13a	"SANDAL"
	C13b	"PUT"
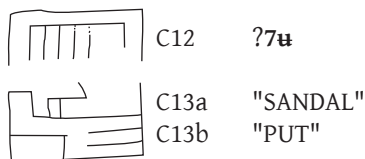
C12-13:

T	**7ʉ**-"SANDAL"×"PUT"
R	0-7ʉy=STOW.E
G	3A-bend=put.away-PA
LT	it-is-stowed-bent

FT   It (your shining rulerly protective garment)
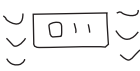   has been partially folded/bent and stowed.
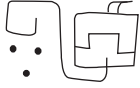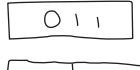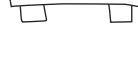
	C14	TITLEx: a type of headgear		D2a	**7i$_2$**
	C15	NEW/**JOME7**		D2b	**ni$_2$**
	C16	?SPEARTHROWER/ **?TʉP.KUY7**		D3	**ne**
	C17	??EFFIGY/ **?MʉTZ.I7**		D4a	**tu**
				D4b	CLOTH/**TUKU7**
	D1	**ya$_2$**		D5	**7i$_2$**
				D6	**7o**

C14-D6:

	T	R	G	LT
	TITLEx	??	(kind of headgear)	(kind of headgear)
	NEW	0-jome7	3A-new	it-is-new
	?SPEARTHROWER	?tʉp.kuy7	shoot-NSTR	spearthrower
	??EFFIGY	?mʉtz.i7	play-AN-INANPL	effigies/models
	ya$_2$	+yaj		

T	**7i$_2$-ni$_2$-ne-tu**-CLOTH **7i$_2$-7o**
R	7in+new=tuku7 7i+7o
G	2E-ridge-cloth 3E-maguey
LT	your ridged cloth its-maguey

FT   The (headgear.types) are new ?spearthrower.effigies/
                spearthrowers.and.??s and your ridged cloth(ing)'s maguey

note: The word 'ridged' here refers to lines of material standing higher than the background, like appliqué or embroidery on the surface of a textile, or raised stitching joining pieces of fabric together at their edges. For the "cloth's maguey", see "Iconographic confirmation of features of the readings".

D7 TEN/**MAK**

D8 HOUSE/**TɄK**

D9a **7i**$_2$
D9b **ni**$_2$

D10 **pɄk**

D11 "FRAMEWORK":
RACK/**TZE7S**

D12 CAPTIVE/**MATZ(.E)**

D13a **7i**$_2$
D13b **ni**$_2$

D14 BLOOD.STASH/
?**NɄ7PIN=KOT.E**

D15 **7i**$_2$

D16 **ko**

D17 FILL/**KOM**
OR PAINT/**KOY**

D7-11:

T	TEN	?HOUSE	**7i$_2$×ni$_2$-pɄk**	?RACK	CAPTIVE
R	mak	?tɄk	7in+pɄk.i	0-tze7s	matz.e
G	ten	?house	2E-take-PN	3A-rack	seize-PN
LT	ten	?house	your-taken-one	he-is-rack	captive

note: A word for 'house' is the name for this day in the Basin of Mexico,
but we have no data on what its Sokean name was; 'house' is *tɄk.*

D12-17:

T	**7i$_2$-ni$_2$-BLOOD.STASH**	**7i$_2$-ko-FILL**	*OR*	**7i$_2$-ko-PAINT**
R	0-7in+nɄ7pin=kot.e	7i+kom.a7		7i+koy.a7
G	3A-2E-blood.stash-PN	3E-fill-AN		3E-paint-AN
LT	he-is-your-blood.stash	its-fill-er		its-paint-er

D7-17:

FT	On 10 House your taken one is a scaffold captive;
	he is your blood collection's filler (or painter/stainer)

note: Proto-Mije-Sokean **kom* means 'to fill with a liquid' (and 'to be filled with a liquid'); its nominalization *kom.a7* 'filler' refers to the source of a liquid that is used to fill something; in this case the captive is the source of a collection of blood for a sacrificial offering.

SEGMENT 3
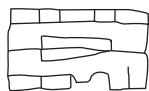
	E1a	MIDDLE/**KUK**
	E1b	"INVERTED.JAWBONE":
		specifies some some location

	E2a	**7i**$_2$
	E2b	**ni**$_2$

	E3	TITLEx: a type of headgear

	E4	NEW/**JOME7**

	E5	?SPEARTHROWER/?**TɄP.KUY7**

	E6	??EFFIGY/?**MɄTZ.I7**
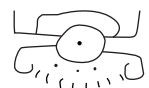
	E7	**ya**$_2$

E1–E7:

T	MIDDLE	"PLACE"	**7i**$_2$×**ni**$_2$ + TITLEx
R	kuk	??	7in+??
G	middle	"place"	2E-(kind of headgear)
LT	middle of the	"place"	your (kind of headgear)

T	NEW	?SPEARTHROWER	??EFFIGY	**ya**$_2$
R	0-jome7	?tɄp.kuy7	?mɄtz.i7	+yaj
G	3A-new	shoot-NSTR	play-AN-INANPL	
LT	it-is-new	spearthrower	effigies/models	

FT	In the middle of "place", your (headgear.types) are new
	spearthrower.models/spearthrowers.and.??s

	E8	LONGLIP2.MONTH/ **JI7TZ.I7**	E13	TITLEy
	E9a E9b	MIDDLE/**KUK** "INVERTED.JAWBONE": specifies some some location	E14	LORD/**KO.YUMI**
			E15 or	DRUM/**KOW.A** YEAR/**7AME7**
	E10a E10b	**7i**₂ **ni**₂	E16	"BAG": SKIN₂/ **NAKA**₂
	E11	**ma**	F1	**ko**
	E12	**pa**	F2	**wɨ**₃
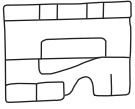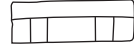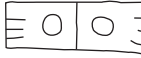
E8–E12:

T	LONGLIP₂	MIDDLE	"PLACE"	**7i₂-ni₂-ma-pa**
R	ji7tz.i7	kuk	??	0-7in+may-pa
G	wrinkle-PN	middle	"place"	3A-2E-count-II
LT	Longlip.month	middle	"place"	you-count-them
	OR			
T	LONGLIP₂	MIDDLE	"PLACE"	**7i₂-ni₂-ma-pa**
R	ji7tz.i7	kuk	??	0-7in+may-pa
G	wrinkle-PN	middle	"place"	3A-2E-tell-II
LT	Longlip.month	middle	"place"	you-tell-it

FT   In Longlip month, in the middle of "place", you (will) count them;
 *OR*   In Longlip month, in the middle of "place", you (will) tell it;

E13–F2:

T	TITLEy	LORD	DRUM-SKIN₂-ko-wɨ₃
R	??	ko.yumi	0-kow.a=naka=kow-wɨ
G	??	ELSE-noble	3A-play.AN-skin-play-IC
LT	"titular"	lord	he-play-ed-drum-skin
	OR		
T	TITLEy	LORD	DRUM	NIGHT-ko- wɨ₃
R	??	ko.yumi	0-kow.a	(0-)tzu7-kow-wɨ
G	??	ELSE-noble	play-AN	3A-night-play-IC
LT	"titular"	-lordly	-drum	it-night-played

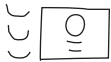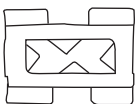FT   the titular lord will have played (a) drum-skin(s).
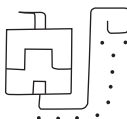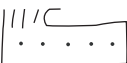 *OR*   the titular lordly drum will have been played at night.

F3   NINE/**MAKTAS**=**TUJTU**
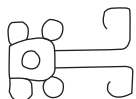
F4   DEER/**MƗ7A**
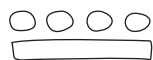
F5a   **7i**$_2$
F5b   **ni**$_2$

F10a **7i**$_2$
F10b **ni**$_2$

F6   **pƗ**k

F11   BLOOD.STASH/
      ?NƗ7PIN=KOT.E

F7   **kak**

F12   OFFERING/
      TZI7>7OY.KUY7

F8   LOINCLOTH/**NI7.JUP.7**
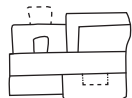
F9   DO/**TZƗK**

F3–F9:

T	NINE	DEER
R	maktas=tujtu	mɨ7a
G	four-plus.five	deer
LT	nine	deer

T	**7i**$_2$**-ni**$_2$**-pɨk**	**kak**	LOINCLOTH	DO
R	7in+pɨ-k.ɨ7	kak.e	0-ni7.jup.7	tzɨk.i
G	2E-take-AN	replace-PN	3A-body-wrap-NSTR	do-PN
LT	your-tak-er	replace-ment	it-is-body-wrapp-er	device

F10–F12:

T	**7i**$_2$**-ni**$_2$- BLOOD.STASH	OFFERING
R	7in+nɨ7pin=kot.e	0-tzi7>7oy.kuy7
G	2E-blood-stash-PN	3A-give-NTP-NSTR
LT	your-blood-stash	it-is-offering

F3–F12:

FT	On 9 Deer, your stauncher/receiver is a succession
	body-wrapping device; your blood collection is an/the offering.

Exemplification of analyses

Once we have identified several words in a row, there is usually only a limited number of ways that they can be related that are not ungrammatical. Among these—because texts are coherent and structured—typically there are some with obvious and close semantic relationships. In all cases we work first on contexts with the best and most restrictive clues.

If we can get at most words and sequences in this way, the text as a whole gets put together into a meaningful story. If the model for the grammar, vocabulary, or writing system is fundamentally incorrect, then this should not prove possible with a text of any substantial length. For the mask, however, we do recover a meaningful and in fact highly structured text from the application of these procedures.

Without delving into particulars of the process of working out our readings of every new sign for which we have proposals—which would require monographic treatment—the remainder of this section addresses various kinds of issues that arise in interpreting the newly encountered signs in this text. These signs and their interpretations are provided in Figure 10.

Signs for the syllable *wɨ*

In an independent (main) clause, a Sokean verb must take one of four suffixes: the completive suffix *-wɨ* ; the incompletive suffix *–pa*; the optative suffix *-7i(n)*; or an imperative suffix *-ɨ7 ~ -a7*. All but the imperative are attested in other epi-Olmec texts, and both the completive and incompletive suffixes occur frequently; however, the known signs for the syllables *wɨ* and *pa* do not occur in the mask text (with the possible exception of what we treat as a numeral 2 at A4, which could in principle be an instance of the syllabogram **wɨ**$_2$).

In the five other legible epi-Olmec texts, the syllabogram **wɨ** is so frequent that it amounts to about one out of every 12 non-calendrical signs. According to our analysis, it is used almost exclusively for two purposes: to spell the completive aspect marker on independent verbs (those in main clauses), and otherwise to spell a relativizer ('which is/was a ...') (typically marking a noun or adjective as modifying a following noun phrase). Based on their frequencies in other epi-Olmec texts, we would expect about 6 instances of verb
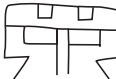
A1b C1b E1b E9b	"INVERTED.JAWBONE": a place or type of place	B14 D12	CAPTIVE/**MATZ(.E)**
A2	"TWIST": TWIST/**WI7T** (maybe FLAY/**TZIK**) or TINY/**NAM**	C5	"INVERTED.HAND": COVER/**NE7K**
B3 C2 E15	"BAG": SKIN$_2$/**NAKA$_2$**	C13a C13b	"SANDAL" "PUT"
A6	"SAWTOOTH": SOAK/**SO7M** *OR* so *OR* ka	C14 E3	TITLEx: a type of headgear
A11	FLINT/ ?**JUKUTU-TZA7**	C16 E5	?SPEARTHROWER/ ?**TUP.KUY7**
B3 E12	**pa$_3$**	C17 E6	?EFFIGY/?**MUTZ.I7**
B5 F2	**wʉ$_3$**	D8	HOUSE/TU-K
B7	"RECTANGLE"$_1$: COTTON/**TZOJA7** or **tzo**	D11	"FRAMEWORK": ?**RACK/TZE7S**
		D17	FILL/**KOM** *OR* PAINT/**KOY**
		E13	TITLEy

Figure 10. Epi-Olmec signs currently known only from the mask text.

suffixes -*wʉ* or –*pa* in the mask's text. In our analysis, we recognize half this number. Whatever one's analysis, these statistics indicate that some other sign must be used in the mask's text as the equivalent of what we read as *wʉ* and/or *pa*.[21] In our analysis, this text deals

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[21] It is worth noting that there is a predictable grammatical difference between narrative texts and (as we take the mask text to be) ritual texts, with inflected verbs playing a larger role in narratives. Comparing the narrative text on the La Mojarra stela and the ritual text on the Tuxtla Statuette—the only texts comparable in length to that on the mask—the narrative text proceeds more via verbal rather than equational clauses: in the La Mojarra text, 40 out of 61 sentences (≈ 66%) have inflected verbs, with completive statements outnumbering incompletives; in the Tuxtla Statuette text, equational clauses are relatively more common, occurring in 6 of 12 sentences (= 50%). The mask text has an even lower rate of verbal predications: we analyze it as containing fifteen sentences of which only three have inflected verbs.

E6

DRUM

E13

F1   ko

      wʉ

F4
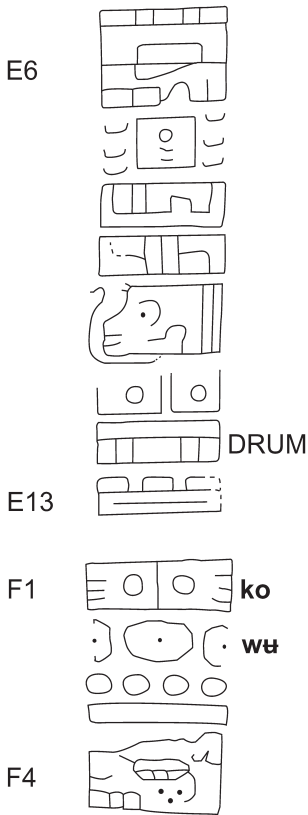
Figure 11. A verb referring to drum playing.

substantially with situations, and otherwise with ritual acts rather than political events.

In an epi-Olmec text of 96 non-calendrical signs, we should expect about five instances of signs spelling *wʉ* and/or *pa* in grammatical functions. A sign for either syllable should usually be the final sign in the written word, and is likely to occur multiple times. Among signs found only in the mask text, none occurs more than twice and only four occur twice each; two emerge as viable candidates for spelling these syllables. An example illustrates our inference procedures (see Figure 11).

One sign we entertained as spelling an independent verb suffix comes just before a day name, and so ends the passage it is part of. It is certainly word-final, and since day names in epi-Olmec texts always constitute or are part of a sentence-initial adverbial construction, we can conclude that what precedes this day name ends the clause in which it occurs. Clause-final position is standard for the verb in epi-Olmec, and was at least the favored position in early Mije-Sokean languages generally. The sign at F2 is therefore (almost?) certain to spell the aspect suffix on a verb; and the verb must be in an independent clause, since dependent clauses precede independent clauses in epi-Olmec. Signs for the syllable *7i* and a sign pair for the syllable *7in* are found in the text, and imperatives are the least likely to appear, so the only plausible readings for the sign at F2 are *wʉ* or *pa.*

The sign spelling this verb suffix is immediately preceded by the sign **ko.** No prefinal verb suffix is consistent with this shape, so this

sign must spell all or part of a verb stem. A verb stem can only be spelled in this way, according to epi-Olmec spelling rules and Sokean verb shape constraints, if it is a verb root shaped *ko7, koj, ko7j, kow, ko7w, koy,* or *ko7y.* Only two of these syllables are the shapes of reconstructible verbs: pMS *kow 'to play (a drum)' and pMi *koy 'to stain it'. Strikingly, this candidate for spelling a verb is preceded, with one sign intervening, by the sign we read as a logogram for 'drum' at MOJ:O*29 (elsewhere, 'year'). Given its semantic specificity, the only reasonable conclusion is that we have here a spelling of a verb whose root is *kow* 'to play (a drum)'; and, given that spellings for the syllables *ji*, *7i*, and *7in* occur in the text, the only grammatically viable readings for the sign after **ko** are *wɨ* or *pa.*

The evidence above supports a conclusion that the sign immediately before the date 9 Deer spells either suffixed *–wɨ* or *–pa*, but it does not establish which. This we resolve by the context of its first occurrence, in column B. At B5, this sign immediately follows the second instance in the column of a sign for the syllable *pɨk.* In the La Mojarra text, the syllabogram **pɨk**[22] spells a verb root meaning 'to take/acquire/achieve something; to get taken/acquired/achieved' (Kaufman and Justeson 2004a: 1102). We also suggested that it could spell a noun root *pɨk* meaning '(animal's) hair, fur; feather' (Macri and L. Stark 1993: 5). On the mask we read the first of these as the verb in its mediopassive reading, 'it got taken', and the second as the noun. This pairing may be seen as an instance of verbal art.

The reading as a noun yields a long noun phrase that is topically coherent. The passage must end by the time a new clause begins with the date 5 Sun. This date is immediately preceded by the textually frequent sign sequence (**tu**)×**TUKU7** for the word *tuku7* 'cloth, clothing'; special cloth is discussed in both of the lengthy epi-Olmec

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[22] Houston and Coe incorrectly transliterate this using capital letters, treating it as a logogram; we explicitly identify it (Kaufman and Justeson 2001: 6) as a syllabogram. CVC syllabograms occur in many logosyllabic writing systems; Houston and Coe's error may be due to the fact that many Mayanist epigraphers have failed to recognize the existence of a class of CVC syllabograms in Mayan writing. However, there are several clear cases in which a sign represents a CVC phonological sequence that spells all or part of different morphemes or morpheme sequences. A few examples from Classic period inscriptions are **7ak'** in spellings of the root *7ahk'ut* 'dance' and the transitive verb root *7ak'* 'to give, to put', **nah** for *naah* 'house' and *nah* 'first', and **nal** for a suffix sequence *–n-al* as in *y-ich-n-al* and for a place name suffix seemingly derived from **naah-a(:)l.* As in other writing systems (for example, Sumerian), CVC syllabograms can take phonetic complements, as they do both in Mayan and epi-Olmec writing.

ritual texts, and in parts of the La Mojarra text that recount ritual acts. Grammatically, this word must be the head noun of its phrase, possibly the entire noun phrase, and, as a complete word it must be preceded by the end of another word. Furthermore, in each of the three segments of the text, the date (in the first segment, the last date) is followed by a statement about a ritual, and the material preceding it discusses the preparations for rituals. The reference to types of clothing, including all three references to *tuku7*, occur in the sections on preparations.

The other two references to cloth or clothing in the mask text are preceded by appropriate modifiers, pSo **new* 'ridge(d)' and *yumi* or *ko.yumi* for 'lord(ly), noble' (*new tuku7*, spelled **ne (tu)×TUKU7**, which is also mentioned on the Tuxtla Statuette, would refer to cloth or clothing having material standing out from the background; such features can be seen (for example) in the higher relief on Cerro de las Mesas Stela 5 and the Chapultepec Stone (see Figure 5).[23]

In the third case, ending the preparations before the events of 5 Sun, the sign immediately preceding (**tu**)×**TUKU7** is **ja**; this sign cannot spell word-final *j*, since *j* is one of the "weak" consonants, along with *7*, *w*, and *y*, that are only spelled before vowels in the epi-Olmec writing system. So, the word it spells must end in *ja*, or in *ja* plus one or two of the weak consonants. This is not a viable spelling of all or part of a word-final verb suffix, except in the unlikely possibility that it were an imperative in *–a7* of a verb ending in *j* whose

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[23] Barbara Stark, along with her collaborators in the archaeology of the lower Papaloapan Basin, has devoted considerable attention to the artifactual and archaeobotanical evidence for the development of a major cotton industry in the region, finding that it probably existed at a very low level toward the end of the Late Preclassic and became a major part of the local economy and ecosystem during the Early Classic. Stark et al. (1998: 19–20) note a correlated increase in the depiction in figural ceramics of elaborate clothing types, including "textilelike garments", details of which Stark discusses in several publications. Her decades of excavation in the region show that stylistic groups of figurines and textile types identified by McBride (1971) were well-established in the Early Classic period (Stark 1977: 92–94 and 2001: 208–210), including most types assigned by McBride to the Late Classic, and (Stark 1977: 92–94) that the Nopiloa tradition described by McBride extended to the coast of the lower Papaloapan Basin.

Stark et al. (1998) cite examples of textile types in this tradition from complete examples, some from Medellín Zenil's excavations and others from exhibitions of Veracruz ceramic sculptures in private collections. Many ceramic figures from these sources show the kinds of ridged features that the term *new tuku7* would apply to, among them, minimally, Medellín Zenil (1987: Figures 31, 40, 42, 56, 59–61, 69, 73), characterized by Medellín Zenil (1987) as "relieves", and Hammer (1971, entries #59, 60, 62, 69–73, and 99).

root vowel is /e/, /a/, or /o/; in all likelihood, **ja** ends the spelling of a non-verb. One and only one candidate makes sense in terms of a discussion of special cloth for a ritual: proto-Soke *tzoja7 'cotton'. Cotton was the clothing of the nobility in pre-Columbian times, so it is an especially appropriate sort of clothing to be prepared for an elite ritual. The Mixtequilla, the epi-Olmec region whose center was at Cerro de las Mesas, became an important cotton producer during the Early Classic period there (300–600 CE), the industry likely beginning toward the end of the Terminal Preclassic (Stark et al. 1998: 9ff). The sign at B7 could be a logogram for *tzoja7* 'cotton' or a syllabogram for the syllable *tzo* (see also note 23).

The three preceding signs are interpretable as a part of the description of this ritual costume, if we interpret the sign after that for *puk* as spelling the syllable *wu* rather than *pa*. Besides the completive aspect marker -*wu*, the other common application of syllabograms for this syllable is to spell the relativizing enclitic +*wu7*. Applied to a noun (or noun phrase), it attributes the property designated by the noun to the referent of another noun phrase; for example, on the Tuxtla Statuette, this enclitic is attached to *tuki* 'turtle' to indicate that a hand-span measuring device was made of turtleshell. Here, the sequence we would read as *puk* +*wu7* would indicate that what follows is hairy/furry or feathered. A single sign, the syllabogram **ku**, appears between the spellings for *puk* +*wu7* and *tzoja7 tuku7*. In this context, *puk* +*wu7* could only serve as a modifier of the word spelled by **ku**, the only viable candidate for which is proto-Mije-Sokean *ku7 'hand; paw'. This entire stretch would then refer to a cotton garment decked out with one or more 'hairy hands/furry paws'.[24]

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[24] This passage, subjected to grammatical analysis in the light of basic facts about Mije-Sokean grammar, turns out to yield a complete reading of a complex sentence with culturally surprising content that may relate to the iconography of a roughly contemporaneous monument from the one epi-Olmec site with a clear and deep cultural relationship to Teotihuacan. It is important in the decipherment of the epi-Olmec script in that it resolves the reading of two previously unknown signs, which was made possible by the known grammatical structure of Sokean languages and the previously established grammatical structure of the epi-Olmec language (for which see Kaufman and Justeson 2004a).

It is an irony that Houston and Coe (2003) introduced to the public this mask, and this passage in particular, in their effort to discredit our decipherment of epi-Olmec writing. They begin by stating that they have no knowledge of Mije-Sokean grammar, which they therefore do not address—in spite of the fact that the grammatical structure of Mije-Sokean languages is a foundation of the decipherment, and in particular for the phonetic reading of its signs. And in spite of this admission, they have no hesitation presenting their own

Cerro de las Mesas Monument 15 (see Figure 6) is one of numerous monuments at this epi-Olmec site that show the site's serious level of engagement with Teotihuacan (Miller 1991: passim; Taube 2000: 44). Its text shows that it is a new year monument (Justeson and Kaufman 2008: 184), evidently commemorating ceremonies performed on 1 Dog as the 363rd day of the outgoing year and 4 Reed as the first day of the incoming year in 468 CE; our assignment of 1 Dog to the five-day year-ending period and of 4 Reed to the first day of the year is secured by the long count on Stela 6, also for the day 1 Dog.

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misanalysis of a three-sign sequence in this very passage as a smoking gun that shows that applying the results of our published work to a new text yields nonsense—because it is ungrammatical!

How do they arrive at this specious analysis? The answer involves mistake after mistake, in two overall steps: misidentifying our readings of the signs, and attempting a grammatical interpretation of the results.

They misidentify two of the three signs in the four-sign sequence that they discuss. (1) Concerning the sign that we had published as a phonetic sign for the syllable *pɨk* (Kaufman and Justeson 2001: 6; see also Macri and Stark 1993: 5), they claim on the contrary that we read it as a logogram for the verb 'to take', and they apply *their* interpretation to both instances in column B; this is in fact our interpretation for the application of the sign at B1, but not for its application at B3 for a homophonous morpheme 'hair, fur, feathers'. (2) They manage to correctly read the sign at B2 as the syllabogram for *kɨ*, and, without argumentation, treat it as a phonetic complement; this happens to be a possible interpretation in this passage, grammatically and semantically, but another feasible interpretation is that it spells a second transitive verb root *ku7w* 'to dye' (see our detailed text analysis below). (3) The next sign, not previously attested in the epi-Olmec script, they treat without comment as if it were a sign we read for the syllable *7i*—presumably based on a vague resemblance to the sign of that reading in the text on the La Mojarra stela. The sign we actually read as *7i* on the La Mojarra Stela does not occur on the Statuette, nor on the mask. In fact, the mask text has eleven instances of the Statuette's sign that we do actually read as *7i* (nine of them are combined with a diacritic in the sequence we read as **7i$_2$×ni$_2$**, spelling the 2nd person ergative marker 'you; your'. There are two signs that we read as *7i*: one on the stela (33 times), and one on the Tuxtla Statuette (4 times); the statistically significant ($p < 0.002\%$) fact that these signs do not co-occur in these two texts indicates that some feature of these texts, such as material, or genre, or the social group of the writer, affects the choice between them. The fact that the mask text frequently uses the Statuette's sign and never that of the La Mojarra stela supports the general view that the choice between the two is fixed in each text. (4) They read the second instance of the *pɨk* syllabogram as a logogram for the verb *pɨk* 'to take'.

Overall, Houston and Coe get our reading for two out of four signs right. Next, they move on to an interpretation of the sequence as "take he take". Ignorant though they claim to be of Mije-Sokean grammar, they assume this to be obviously ungrammatical. The best one can say of this exercise is that they are able to recognize nonsense in the nonsense they themselves have created. What we have shown is that if one uses the actual grammatical constraints of the language, correctly identifies the signs, and uses our actual interpretations of those signs, the text yields perfectly grammatical sentences in a Sokean language and culturally significant information about epi-Olmec ritual practices.

This monument depicts a figure wearing Tlaloc-style goggles; the garment the figure wears *may* be depicted as being garment covered with human hands—right hands on the figure's right, left hands on the left. This is suggested by what appears to be an extended index figure on these potential hands, pointing upward and toward the center of the monument. This would be a striking confirmation of our previously-established readings, and would secure the reading of the sign at issue with the syllable *wʉ* rather than *pa*.

Nonetheless, it is not clear from the photos that we have access to that these elements do indeed depict hands; details are frankly not well preserved. They can even be seen as human faces in profile. Unfortunately, the whereabouts of this monument are seemingly unknown (Barbara Stark, personal communication in the 1990s), so this issue cannot be resolved at present.

The noun phrase in question is preceded by three signs, which themselves follow a divinatory calendar date that begins this part of the text. The first two have known readings: the sign for the syllable *pʉk* followed by the sign for the syllable *kʉ*. We have previously treated the sign **kʉ** as a phonetic complement to the syllabogram **pʉk** on the La Mojarra Stela, and we so interpret it in this case (see note 19). Read in this way, the word *pʉk* seems unlikely to be the noun 'body hair, fur', as this would yield an equational clause to the relatively uninformative effect that a hairy thing is a cotton garment with hairy hands. If it is a verb, however, the sign at B3 must spell the obligatory aspect marker that ends the verb *pʉk* 'to take', and in this case its only plausible reading is as the syllable *pa*.

This sign for *pa* happens to be the other sign not attested in other legible epi-Olmec texts that occurs twice in the text on the mask. In its other context, it occurs in the sign sequence **7i$_2$×ni-ma-pa$_3$**, a straightforward spelling of a transitive verb in the incompletive aspect. Two other monuments record a verb whose root is spelled identically, also at stations of the CNVC: *may-wʉ* 'it was told/counted' on the La Mojarra stela, in connection with the sacrifice of a prisoner on occasion of a speaker's inauguration, and either *may-wʉ* or *7anh=may-wʉ* 'he instructed them/him/her' on Cerro de las Mesas Stela 6, which records only this one event and whose accompanying image indicates that the ruler is speaking (Stirling 1943: 35; Justeson and Kaufman 2008: 173).

Recognizing these two signs as having the readings *wɨ* and *pa* yields 4 instances of these signs—somewhat but not substantially lower than the frequencies of signs for these syllables in other epi-Olmec texts.

Previously unattested signs for day names

The previously unattested sign at D8 raises no interpretive difficulties, because it occurs in a ritual calendar date. Given that it occurs immediately after a numeral between 1 and 13, and that its form is essentially equivalent to those of signs for the day House as the frontal view of a building with a stairway at Xochicalco, there can be no doubt on the interpretation of this sign as spelling the name of the third day of the ritual calendar. The example on the mask is, to our knowledge, the earliest attestation of this day sign in any tradition; but we do not know whether the sign was introduced into epi-Olmec writing under Teotihuacan's influence or into the Basin of Mexico under epi-Olmec influence.

The section "Overall text structure" discusses the use of the epi-Olmec logogram **SɨW**/SUN for the 16th day of the divinatory calendar, and its basis in day name vocabulary rooted in the Basin of Mexico and otherwise diffused from there. Along with the day name (or sign) 'house', the appearance of this day name is another reflection of the central Mexican association of the mask's epi-Olmec text. Again, we do not know in which direction the innovated use of a word for 'sun' as the name of this day diffused.

New insights about previous readings

At some points, the new data contribute to a rethinking of previously analyzed material. One example concerns the logogram for 'offering' (i.e., 'offered thing'; Figure 12). The meaning of this sign was recognized and interpreted from its context on the La Mojarra text (Kaufman and Justeson 2001: 42). The sign is symmetrical around the vertical axis, with two elements jutting out below and separated at the central axis. On the O'Boyle "mask", at OBM:D1, what we now recognize as the same sign was rendered in effect as a fuller form; it too is symmetrical along the vertical axis, but with four projecting elements; the two below are strongly separated at the bottom, while
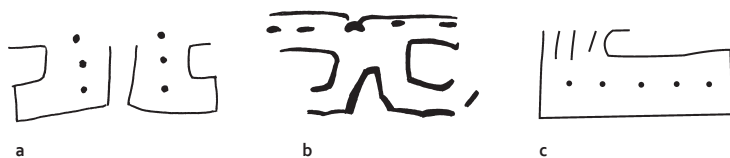
Figure 12. Variant forms of a logogram for 'to offer': *a)* MOJ:N12, *b)* OBM:D1, *c)* TEO:F12.

the two above join very near the top. Both signs are decorated with dots on the left and right sides—on the upper projecting elements on the O'Boyle mask, and on the only projecting elements (which are descending) at La Mojarra. In effect, the O'Boyle mask example is something like the prototype on which the La Mojarra example would have been based, except that the projecting elements on the O'Boyle mask are proportionally longer. The sign at TEO:F12 is similar to the lower righthand quarter of both the MOJ:N12 and OBM:D1 signs, agreeing with OBM:D1 in that this element is elongated horizontally, and this single projecting element is decorated with dots.

All three contexts are consistent with the meaning 'offering' that is indicated by the context at MOJ:N12. Grammatically, any Mije-Sokean word for an offering is almost sure to be a nominalization of a verb stem meaning 'to offer'; in its context at OBM:D1 the sign spells the stem of a dependent completive verb, 'when I/we(excl.) offered it/them'.[25]

Iconographic confirmation of features of the readings

As is to be expected in representations of lost ritual practices, some of the overt statements in the text are obscure. One such statement is "The headgear (insignia) are Xs; they are your ridged clothing's maguey." These are unlikely to refer to maguey spines—which might have been used for bloodletting—since *7apit* 'thorn' rather than *7o* 'maguey' should be the head noun in such a reference. Initially, this statement was as surprising as it was unambiguous. However, its

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[25] In its context on the O'Boyle mask, we interpreted this sign as a logogram for a verb referring to a ritual act. We had suggested a provisional interpretation of OBM:D1 as proto-Sokean **sij* , reconstructible in the meaning 'to cast lots' (Kaufman and Justeson 2001: 2.84), based on transcribing the sign as ?CAST.LOTS to mark our uncertainty.
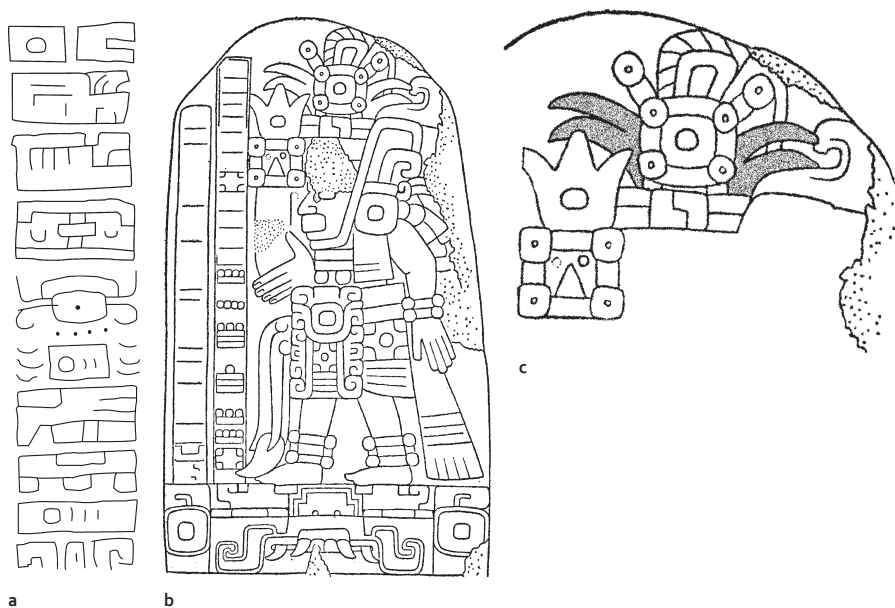
Figure 13. Maguey in headgear: *a)* textual statement on the mask text, 'the "headgear insignia" are new ?? ??s and your ridged clothing's maguey, *b)* Cerro de las Mesas Stela 8, showing maguey in headgear, *c)* detail of maguey in headgear (after Justeson and Kaufman 2008: fig. 13).

relevance is confirmed by the imagery on Cerro de las Mesas Stela 8 (Justeson and Kaufman 2008: 175): the headdress of the figure on this epi-Olmec monument includes a plant that Peter Mathews and we independently identified as a maguey (Figure 13). While the reference remains puzzling, Stela 8 makes it clear that maguey was indeed at times, in some way, considered a feature of headgear in epi-Olmec ritual practice; the statement in the mask text and the depiction on Stela 8 presumably refer to the same kinds of costume features.

Similarly, the raised elements of clothing worn by the figures on relief sculpture verify the wearing of "ridged" (*new*) cloth/clothing described in texts of the mask and of the Tuxtla Statuette; they are reflected in the Classic period monuments at Cerro de las Mesas and in ceramic sculptures from the general Mixtequilla area (Stark et al. 1998: 18–20).

Uncertainties and unresolved issues

For some logograms, our prior understanding of a sign's meanings or readings is not advanced enough for us to be entirely explicit in our interpretations, and we can provide only approximate semantic glosses for the relevant sections of texts; this is the case, for example, of logograms for titles.

(1) One curiosity is that we have been able to narrow the reading of one of the otherwise unattested signs in this text to one of two possibilities, which are neither phonetically nor semantically comparable. The tightest grammatical and semantic constraints come from its appearance between the sign for 'drum' and a verb for drum-playing. The sign that we have read above as *naka*, meaning 'skin, hide, leather' could instead be read as *tzu7*, meaning 'night'. We see no plausible alternatives to these two readings. We must read the sign at A2 as a modifier of one of these words. If the word is to be read *tzu7*, the Sokean languages provide us only three lexically supported modifiers, two of which are ruled out because they happen to be spelled by other signs in this very text. The remaining possible modifier is *nam*, meaning 'tiny' or 'new', with *nam=tzu7*, a reconstructible proto-Soke word, referring to the last few hours before dawn.[26] The following differences emerge.

The first passage would become:

A1-9:   kuk ??, nam=tzu7, wɨs=tɨk nɨ7pin=so7m.a7 7aw=tzɨk.i.

In the middle "place," before dawn,

two blood-soakers have been prepared in advance.

During this part of the Venus cycle, Venus would have been visible in the pre-dawn sky.

The beginning of column C would read:

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[26] Evidence for proto-Soke *nam=tzu7 is the following:

MAR	(7anh=)nam=tzu7	'(muy) de mañana, de madrugada'
MIG	7anh=nam=tzu7	'temprano en la mañana'
TEC	nam=tzu7	'madrugada, mañana'
COP	nam=tzu7	'madrugada, temprano'

C1-11:   kuk ?? tzu7 7in+nek7.a7 7in+kij.i ?? tuku7

                In the middle "place," at night,

                 your shining "rulerly" garment is your protective covering.

Venus would be visible in the early evening on this date.
   The ritual in column E-F would read:

E13-F2:   ?? ko.yumi kow.a tzu7=kow-wʉ.

                the "noble" lordly drum will have been played at night.

This too was a date on which Venus would be visible at night.
   One appealing feature of the 'night' reading is that the timing of
each ritual is during Venus's visibility—pre-dawn on 13 Flint, and
in the evening on 10 House and 9 Deer. This agrees with our only
evidence on this issue. The La Mojarra auto-sacrifice rituals, timed
in terms of the cycle of Venus, were performed when the planet was
visible: the sequence of actions on the Venus anniversary in that
text begin when the constellation Scorpius appears (with Venus in
its head), and the narrative of these actions ends with statements
that Scorpius and Venus (still) shone.
   An advantage of the 'skin' reading is that the construction
involved in the verb for playing a drum is certainly grammatical.
It is not known whether the construction required by the 'night'
reading—a non-active reading of an underlyingly transitive verb
kow without any mediopassivizing suffix—would be grammatical in
epi-Olmec. Currently the verb *kow 'to play an instrument' survives
only in Mijean, though the derived noun *kow.a 'musical instru-
ment' survives in both Mijean and Sokean. In fact, in Oluteko and
Totontepec Mije, both Mijean languages, *kow* has both transitive and
antipassive uses, but not mediopassive ones. Strategically it might
be unwise to urge a mediopassive reading here.
   There are also other possibilities for interpretation at various
points. For example, although we prefer the reading *so7m.a7* 'soak-er'
at A6-7, another possibility involving a reading of the sign at A6 as a
syllabogram **ka** or as a logogram **KAM** also makes sense:

A1-9: kuk ??, ?? naka, wʉs=tʉk nʉ7pin=kam 7aw=tzʉk.i.

> In the middle "place,"
> ??flayed skin and two blood-hard things have been prepared in advance.

This would refer to an object that has had blood dry on it through repeated use, something feasible in the context of blood offerings. One appealing feature of this interpretation is that noun-adjective compounds like "blood-hard" are a regular construction in Mije-Sokean languages.

Part II: The structure of rituals in epi-Olmec texts

As our reading of the text on the mask exemplifies, epi-Olmec texts provide considerable information about epi-Olmec ritual practices, laying out both preparations for them and the progression of events within them.

Ritual structure in the text on the Teotihuacan-style mask

This section describes the progression of ritual action in the longest Classic-period epi-Olmec text; the next two sections compare this with information on the sequences of ritual action gleaned from the La Mojarra and Tuxtla Statuette texts.

Our analysis of the mask text shows it to be a ritual text of highly formulaic structure, defined in terms of a set of dates and activities of parallel types (Table 4). Each of the three segments has the same basic structure, though the details of their execution differ.

The mask text cannot be a narrative, because it contains few inflected verbs—just three, by our analysis. Mije-Sokean narratives are always carried along by verbs. In this respect, this text differs not only from the historical narrative of La Mojarra but also from the ritual narrative of the Tuxtla Statuette; its rate of occurrence of inflected main verbs is only 20%, compared to 50% on the Statuette. Nonetheless, the types of ritual acts on this text are similar to those on the other two texts, and the progression of ritual actions it specifies agree with the fuller data on the progression of ritual action that is laid out on La Mojarra Stela 1.

PARALLEL STRUCTURES IN THE EPI-OLMEC TEXT ON A TEOTIHUACAN-STYLE MASK

SEGMENT 1: VENUS YEAR 1 (beginning: **11 "Storm"**)	SEGMENT 2: VENUS YEAR 2 beginning: **10 "House"**	SEGMENT 3: VENUS YEAR 3 beginning: **9 Deer**

PREPARATION PHASE:
in the middle of (place),   **in the middle of (place),**   **in the middle of (place),**
things are "prepared in advance"
   for use in ritual:
     blood soakers (for stauching blood)
     bloody Xs

RITUAL GARMENTS PREPARED:
on day 120 of CNVC
   clothing is taken and dyed   **clothing** (and other things)   **clothing** (and other things)
     for use in ritual   are on hand for use in ritual: are on hand for use in ritual
         garment has been
          partially folded
         and put away

       headgear: X's are new Y's   **headgear**: X's are new Y's
         and are your   in the middle of (place),
           ridged outfit's maguey   in month Ji7tzi7,
              you will count them (or: tell it)
           the noble lord
             will have played drum(skin)s

SACRIFICE-RELATED PERSONS AND EVENTS:
on day 138   on day 1   on day 1
   (standard Venus station)   (anniversary of Venus base)   (anniversary of Venus base)
                                                      stauncher is a succession outfit
rulerly person   your captive   your blood collection
   is a captive   is the source of your blood   is an offering
                            collection

Table 4. Parallels in the time progression of sacrificial rituals in the mask text in successive Venus cycles within the circumnodal Venus cycle.

Chronology provides one formulaic dimension of the text. The events of the full text occur over three successive Venus years (i.e., calendrical cycles of 584 days), one Venus year per text segment. Each segment is anchored chronologically in one of the two CNVC stations known to have been salient for epi-Olmecs in scheduling public rituals (see "Overall text structure"), the base of the cycle and a date about 134 days after that base.

Another recurring feature of the ritual sequences is that each segment begins with preparations for the ritual—certain things are prepared in advance of the focal ritual acts. In all three Venus years, some of the things prepared in advance were particular, specified types of clothing and/or accoutrements such as royal headgear. In the first part of the first segment, the text explicitly states (A1-A9) that particular named things "have been prepared in advance", for an unstated but presumably known purpose, perhaps implicit in the second and third segments. These preparations are described before the CNVC-related date (which, in segment 1, is the second of two dates).

Each segment ends by referring to some kind of ritual action or situation that involves a captive and/or a sacrificial offering of blood; the references to these actions follow the CNVC-related date in each section. In segment 1 and segment 2, the ritual involves a captive, and in segment 2 some of his (or another captive's) blood is collected for an offering. In segment 3, we do not know if anyone was sacrificed—bloodletting could be involved instead—but blood is collected from someone for an offering. Each of these events is mentioned after the date (in segment 1, after the later date, which falls at a station in the CNVC).

According to this presentation of the formulaic structure of the text, there are two main variations in the content and chronology of its three segments, variations that reflect a shift in emphasis from detailing the preparations for sacrificial or offertory rituals to detailing the progress of the rituals themselves.

1. Two different ritual acts are referred to in the third Venus year, while only one is mentioned in each of the first two segments. The first of these acts in segment 3 was the beating of a drum. We believe that this was part of the preparation for the second ritual, involving an offering of blood. There are two reasons for this: (a) the reference to this ritual precedes the only date in this section of the text; and (b) on the La Mojarra stela text, the beating of drums was one of the first actions performed in preparation for an upcoming ritual of blood sacrifice.

2. The other difference is the chronology of text segment 1. In this first Venus year, the preparations are broken into two sets of

activities, 18 days apart. In the second and third Venus year, all the activities seem to pertain to a single date. In addition, the main ritual action in the first Venus year takes place on day 138 of the CNVC; in the La Mojarra text, the corresponding date (roughly, the 134th day) in the CNVC is that of the sacrifice/ killing of a prisoner taken in battle 13 years earlier; it is also seemingly the date of accession of the youth—born after the date of that battle—who carried out the sacrifice in the course of acceding as ruler. In the second and third Venus years on the mask, the main and more elaborately described ritual actions occur on a Venus anniversary of the day 11 Storm; 11 Storm was the beginning of the Venus year of segment 1, and the last prior base of the CNVC. On the La Mojarra stela, the text also opens with a major event at a CNVC base. What is arguably the peak event of the narrative, to which more space was devoted and more detail elaborated than for any other date, occurs on the ninth Venus anniversary of the CNVC base event. This peak event was a ritual involving a series of bloodlettings by the ruler and his supporters, and actions in preparation for them.

In general terms, the structure of this text is broadly comparable to that of ritual almanacs like those of the Dresden Codex. It runs through sections that subdivide a single ritual cycle—in the Dresden Codex, usually through fifths or quarters of a ritual calendar cycle, on the mask text through each of the Venus years of a CNVC. There are constants in the overall structure of what is recorded in association with different stations on different dates, and also variation in the content. In the codices, however, the formulaic almanac passages are short, usually tightly parallel to one another syntactically, and highly repetitive lexically. Typically, some features—a verb and/or a subject and/or an object and/or a location—recur in each of the parallel statements, while another feature or two varies. In the mask text, in contrast, the passages are often fairly long and are syntactically diverse. Locations recur and types of (CNVC-related) dates progress, but there is no direct substitution of noun phrases or verbs from one segment to the next in the same syntactic frame. What is formulaic is the thematic and chronological structure of the text (these parallels are laid out in Table 4).

There may be a further dimension of the formulaic character of the mask's ritual text, beyond the parallelism of its content and general format. Given its calendrical structure, the ritual cycle of this text could have been performed several times during the Classic period—whenever 11 Storm fell close enough to a base of the CNVC (see Table 3). This might be especially true of the three pairs of viable CNVC base dates in Table 3 that are separated by thirteen 360-day years; imaginably, formal recurrences at this interval, but that do not fit the astronomical patterns as closely, might have been entertained as well. In this connection, note that this 13×360-day interval is recorded in the opening passages of the La Mojarra text, and separates the taking of a captive from maybe a presentation of him; 6 months later, that captive was sacrificed (see next section for details).

Textually, it is consistent to suppose that the mask was intended for use in just such recurring performances: all of the events on the text can be read as being customary; since these customary events are provided with dates in the ritual calendar, the event types described in the text could, in principle, recur on those dates.

On the other hand, it is not required to interpret the text in this way. The text might pertain to a set of rituals performed over just one historical sequence of three Venus cycles.

It may also be the case that mask text represents a single, longer-term sacrificial ritual—that the generally parallel representations of ritual situations and actions in each Venus year refer to different sequential phases of a ritual process that develops over the course of just one set of three successive Venus years. For example: During the first Venus year of the 11 Storm CNVC, a captive may have been presented publicly; in the second, he may have been bound to a rack and kept alive while having his blood drawn for offerings; and in the third the sacrificial events may (but may not) have gone further, to the point of his being finally dispatched.

Ritual sequences in the La Mojarra text

The long historical narrative of the Late Preclassic stela of La Mojarra provides our most elaborate data on distinct types of rituals and their progression. The last 70% of the text is devoted to the events of just three days. On average, 120 signs are devoted to the narra-

tive of each of these days' activities, which are mostly ritual events. The result is that we get a fair amount of detail about the progression of ritual activities, mostly focusing on the sacrifice of blood, that took place on those dates. (For a full translation of the text see Kaufman and Justeson [2001: 34-74] and Justeson and Kaufman 1997; cf. Kaufman and Justeson 2004a for more detailed grammatical analysis of many passages).

This section summarizes the most elaborate epi-Olmec data on the progression of ritual action, that for the last three days whose events are described on the La Mojarra stela—on 8.5.17.14.0, 8.5.17.14.9, and 8.5.17.15.2, a span of 23 days altogether. The background to these events concerns the rise of a new ruler to power. The narrative begins with a battle over royal succession. It took place on a base of the CNVC in the late afternoon or evening of May 1, 143 CE (8.5.3.3.4), or shortly thereafter. On 8.5.16.3.7—8×584 + 11 days later, and at or within days of the next base of the CNVC cycle—a prisoner is mentioned who was sacrificed 120 days later as part of the inauguration rites of a 12-year old boy who acceded to rulership.

The remainder of the text deals mostly with rituals that the boy-king performed during the first Venus cycle of his reign, and with another battle; afterward, the king's brother-in-law—we suppose a would-be usurper—was sacrificed. There is a set of bloodletting rites on 8.5.17.14.0; a battle, and sacrifice of blood from a battle captive, on 8.5.17.14.9; and a further sacrifice of his blood on 8.5.17.15.2, that may have involved killing him.[27]

8.5.17.14.0: 20 September 157 CE. The peak event of the narrative was the ruler's auto-sacrifice by bloodletting from his penis. The account of the events of this night details a sequence of actions leading up to this act of bloodletting, and then the wrap-up of the ritual. All of the action occurred during the few hours that Venus was visible in the head of Scorpius. The action was scheduled relative to the Venus cycle: it took place on the ninth Venus anniversary of the battle over succession that opens the text (more precisely, exactly 9

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[27] Some ritual activities in the La Mojarra text are alluded to without being explicitly described. The three dates discussed above are the first day, the tenth day, and the last day of a 23-day period in which a jaguar was "taken" each day. The activities surrounding the taking of these jaguars are not described, so it is not clear how jaguar taking relates to the other actions, but on the tenth and the 23rd day they appear to have predated and to have provided part of the context for the other activities described for those days.

canonical Venus years—9×584 days—after the recorded Venus event that was associated with the solar eclipse and the battle with which the text opens). It also fell roughly one Venus year after the allusion to the holding of a prisoner from that battle during the next CNVC base (the text does not indicate the specific date of that base).

In the late afternoon or evening, the ruler appeared while Scorpius was visible, with Venus shining in the head of the scorpion. A ritual space was measured out (by multiple participants, and by hand-spans, so likely in a relatively small and maybe private space), presumably for the performance of the upcoming rituals. After a drum was played, the ruler's clothing was dealt with in a standardized way (we hazard 'to fold up' as the meaning of the verb, but only based on the form of the sign), either 'at first' or 'in front'. The most straightforward interpretation, given the statements that follow, is that the loincloth was removed and set aside, in preparation for bloodletting, and for the later use of the loincloth to staunch the flow of blood from the ruler's penis. After his clothing was set aside, the ruler drew blood from his buttocks, which was collected and poured out as a sacrificial offering, an offering proclaimed by the king himself. Then, under the auspices of a Venus god named Ten Sky, a group of supporters drew blood from their buttocks, after which the ruler drew blood from his penis. At this point, a macaw-headband was supposed to be taken. Not long thereafter, the ruler sang a song about a shape-shifter, and then his loincloth and royal "head-wrap" (perhaps the kind of head-band or bandanna covering the scalp worn by Mayan lords) were used to staunch the flow of blood from his penis. At the end of this sequence of events, Venus and Scorpius were still visible.

8.5.17.14.9: 29 September 157 CE. The narrative picks up nine days later. The background statements about this occasion are that a jaguar was to be taken —evidently the 10th in a series of 23 that were taken over a period of 23 days—and an item of headgear was on hand for the ruler, linked to his having held a specified status for more than a year. A battle takes place with the would-be usurpers, who are described as overturners of inscribed stones. Afterward, the king announces that his own blood is being offered. The ruler's supporters by now have one of the would-be usurpers at their disposal (presumably, a captive in their custody), who was evidently

dressed as some kind of bird, and they "deal with" (possibly 'spear') this person. Someone, we suspect the king, but possibly the enemy, is dressed as a macaw to impersonate a shape-shifter or his animal guise. As the bloody enemy quivers, the macaw-person declares, "I am the sun," which we take to be an allusion to a myth similar to that about the macaw personage Wuquub' Kaqi7x (Seven Macaw) in the *Poopol Wuuj.* Finally, the bloody enemy "sets down" (epi-Olmec *tɨɨ7p* 'to set like the sun, to land like a bird, to fall to the ground'), his bloody wing or shoulder quivering.

8.5.17.15.2: 11 October 157 CE. On this twenty-third day in the sequence, after a twenty-third jaguar was taken, various objects (perhaps the overturned inscribed stones) are replaced upright. Then the ruler's supporters again "deal with" the captive, who is the ruler's brother-in-law (perhaps more likely his sister's husband than his wife's brother, inasmuch as the ruler was now only thirteen years old). Now a blood offering, presumably from the captive brother-in-law, is supposed to be used up, and his blood is sprinkled "on behalf of others", i.e., of the community.

To present parallels with the Teotihuacan-style mask text, we compare each of the three ritual segments of the text on the mask to the ritual sequences from the La Mojarra text.

In segment 1, the mask text simply indicates that at the second CNVC station there is/was a captive (*matz.e*) of a specified status, without referring to any actions performed on that date; blood sacrifice is mentioned explicitly in segment 2. Similarly, in the La Mojarra text, the first mention of a prisoner (*pit.i*) at or near the base of a CNVC, states that there is one who has been a prisoner for 13 years—an 8-Venus-year span of one complete CNVC—and on the next recorded occasion, at the second station of the CNVC, he is sacrificed.

A blood sacrifice reference is overtly mentioned in the second section of the mask text. The sacrifice occurred, or would occur, on 10 House, the first Venus anniversary of the 11 Storm base of the CNVC. On this occasion, the blood of a prisoner (perhaps but not necessarily the same one as on 5 Sun) was used as a sacrificial offering that has specific parallels to the last one mentioned on the La Mojarra text, at MOJ:U1-3: it was referred to using the same term for the collection of blood that was to be offered (MOJ:U3, TEO:12), and

the ritual described on the stela occurred twenty-two days after a Venus anniversary, and thirteen days after a battle where a captive was taken. In a more general way the sacrifice at TEO:D7-17 parallels the ruler's auto-sacrifice on the La Mojarra Venus anniversary date, which is more explicit about the preparatory work.

As in the La Mojarra text, our analysis of the mask text shows that blood sacrifices were enacted on Venus anniversaries of the CNVC base, and, in the first Venus year, that a prisoner or prisoners were dealt with about 134 (here, 137) days after such a base. However, because the events of that day in the case of La Mojarra are not discussed in as elaborate detail as other ritual activities, below we instead present for our parallel the treatment of a second war captive in the La Mojarra text, taken a Venus cycle later (on 8.5.17.14.9, or 29 September 157 CE).

The third section of the mask text refers to the use of the loincloth not only to staunch the flow of blood from auto-sacrifice, but also to thereby collect enough for a sacrificial offering—a blood offering referred to in the same

Figure 14. Semantically parallel statements about the use of royal outfit elements to absorb blood from acts of bloodletting: *a)* 'now, my penis receiver (=stauncher) had earlier been a body wrap (loincloth) and a royal head wrap', *b)* 'on 9 Deer, your (penis) receiver (=stauncher) is a succession body wrapping device (loincloth)'.

terms as the one that had been gathered from the prisoner one Venus year earlier (Figure 14). The statement about this use of the loincloth parallels the statement on the La Mojarra stela about the
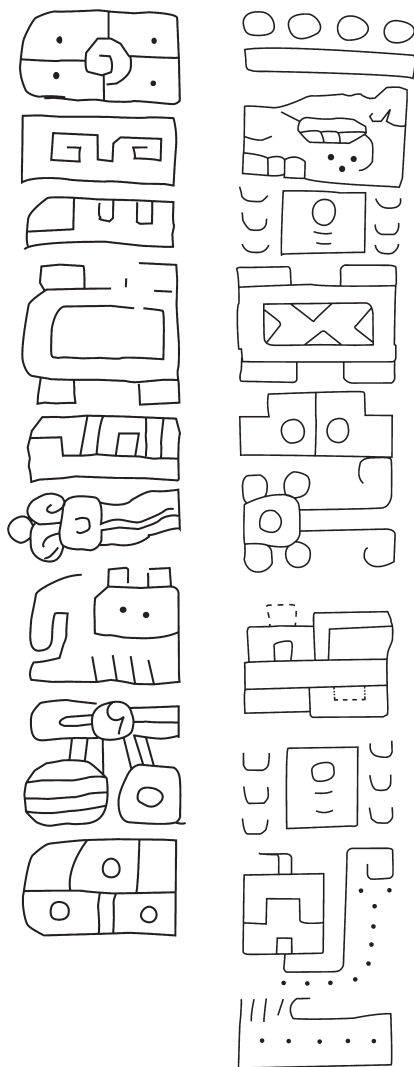
ruler staunching the flow of blood from his penis with a royal loin-cloth (Figure 14a). Calendrically, this offering was made in the first year of a CNVC on the La Mojarra stela but in the third on the text of the mask.

In the La Mojarra text, the Venus anniversary events began sometime after Scorpius was visible. Venus was in Scorpius on this date; they were high in the sky at sunset, and Venus would have been visible before any of the stars of Scorpius. The narrative of the events of that day ends with Scorpius and Venus both still shining; all of the narrated events associated with the Venus anniversary took place during the time that Venus was visible in the night sky. We therefore take it as likely that the events of 10 House and 9 Deer also took place at night, or in the late afternoon, during the period of visibility of Venus.

The third segment of the mask text, dealing with the second anniversary of the 11 Storm base of the CNVC, explicitly addresses the lord's involvement in the sacrificial rites, and so provides comparisons to the La Mojarra narrative that are not present in the first two segments of the mask's text. In both ritual sequences, the playing of a drum precedes the bloodletting rites.

Two segments of the La Mojarra text offer details about processes of capture and sacrifice that unfold over time; they compare with the sacrifice portions of each of the mask's segments.

1. The 'prisoner' (*pit.i*) taken in battle near the beginning of the La Mojarra story (probably on 8.5.3.3.7) was held for a full CNVC cycle of thirteen 360-day years (8 Venus years)]. The first event recorded for the next CNVC was the sacrifice of that prisoner by a new king on the date of his inauguration; this was done on or near day 135 of the first Venus year of that CNVC. Similarly, on the mask, the main ritual action in the first Venus year of the CNVC textually, a presentation of a high ranking 'captive' (*matz.e*), takes place on day 138 of the first Venus year of a CNVC. The La Mojarra CNVC was one that lasted 3 Venus cycles; the mask presents the first three Venus cycles of its CNVC, but we do not yet know whether this was the full length of that cycle.

2. On the La Mojarra stela, the peak ritual event of the narrative—to which more space was devoted and more detail elaborated

than for events of any other date—occurs on the ninth calendrical Venus anniversary of the base of the CNVC with which the text begins. This ritual involved a series of bloodlettings by the ruler and his supporters, and actions in preparation for them. (We take these rituals to be preparatory for the battle that took place 9 days later). In the second and third Venus years on the mask, the main and more elaborately described ritual actions, culminating in sacrificial offerings, occur on a Venus anniversary of the base of the CNVC with which the text opens.

3. The brother-in-law taken in battle near the end of the narrative was held not for 13 years, like the prisoner discussed at the opening of the text, but for 13 days. During that time, he was a source of blood collected for offerings, and, terminologically, the description of his final sacrificial offering closely parallels the final description on the Teo mask; see Figure 14.

Ritual sequencing in the Tuxtla Statuette

The text on the Tuxtla Statuette focuses on the preparations for a ritual, followed by the main ritual action. Here, the sequence agrees with that of the La Mojarra text, with bloodletting preceding shape-shifting, but the focus is on an act of shape-shifting rather than a bloodletting. The Statuette's text clarifies one detail from the mask text.

The sequence on the Statuette begins by identifying the status of the person performing the ritual, followed by an addressing of the god under whose auspices it is performed. A tool (made of turtle shell) for measuring by hand-spans, having presumably been used to measure out a ritual space (as explicitly stated at MOJ:O27), is stained. It, or something not mentioned, is hallowed by being sprinkled eight times with blood, which was presumably drawn in an act of auto-sacrificial bloodletting; the offering of blood by means of blood-stained objects was carried out, at least in this instance, by its burial. The god will then provide "ridged" clothing and royal headbands; the headbands may be the staunchers or the collectors of blood for offerings. The final ritual act is for the person performing

the ritual to pass out and shape-shift into a powerful animal spirit counterpart (*nup jama*).

On the Tuxtla Statuette, a god distributes ridged clothing and headbands of high rank or office to probably a group of people a while after at least one of them performs his bloodletting. In the Teotihuacan-style mask, too, the ridged clothing belongs to a high-ranking participant in the ritual, possibly the only participant other than the god being addressed and the captives from whom blood was taken. It was made ready or available during the preparation for drawing an offering of blood from a captive, and would presumably have been worn by the lord during some phase of that ritual. In both cases, the ridged clothing is made available before the act of bloodletting; how and when it was used is not made explicit, so the nature of its relevance must depend on cultural knowledge assumed by the writer and readers.

Summary of correspondences

There are several points of contact among the epi-Olmec texts in their references to rituals and ritual paraphernalia.

Like katun- and year-endings among Lowland Mayans, among epi-Olmecs the CNVC was a broadly applied framework for the timing of publicly-celebrated activities: for varied types of blood-sacrifice rituals discussed in Part II, other ritual types depicted at Cerro de las Mesas (Justeson and Kaufman 2008), and events such as battles over political succession with a substantially non-ritual focus (Kaufman and Justeson 2001). The chronology of the mask appears to be framed almost entirely in its terms. Nonetheless, some rituals were timed in other ways; for example, that of the Tuxtla Statuette took place on the 260th day of the 365-day year.

Ritual cloths or outfits were prepared in advance of rituals (MOJ, TUX, TEO; probably also on the Chiapa de Corzo sherd), and set aside for later use. A particular type of outfit, the *new tuku7* ("ridged clothing"), has been identified (TUX, TEO); it seems to be associated with people in control of the ritual, not with sacrificial victims. Complex headgear assemblies are mentioned (TEO, MES).

Two contrasting types of blood sacrifice are documented: auto-sacrifice and offerings of blood drawn from others.

We have records of two rituals involving auto-sacrifice (MOJ, TUX; in MOJ, a group of people performed auto-sacrifice from their buttocks, after which the ruler drew blood from his penis). In both cases, spaces were measured out beforehand by handspans. This suggests that these rituals were conducted in a smallish space— perhaps privately, perhaps publicly on a raised platform. In both cases, shapeshifting occurs or is otherwise engaged with textually (on MOJ, in connection with the ruler). Both involve persons of high rank and both took place when Venus was an evening star; in one case (MOJ), the auto-sacrifice is known to have been enacted at night.

The blood of prisoners (MOJ: *pit.i*) and captives (TEO: *matz.e*) is not known to have been drawn in acts of auto-sacrifice; rather, their blood was collected for later use (MOJ, TEO; what we gloss as a 'blood stash' or 'blood collection'), which is not documented for cases of auto-sacrifice. It is not clear whether blood collecting is always done when it is others' blood that is sacrificed, nor is it clear that persons whose blood is collected were always or even ever killed as sacrificial offerings. We have one documented instance of an execution (MOJ), which seems to be part of the accession of a ruler to office. The ruler's brother-in-law was plausibly executed as well, 13 days after the battle in which he was taken, but the text does not say so.

Drums were beaten in connection with rituals involving persons not having their blood drawn by others (MOJ, TEO); when auto-sacrifice is mentioned (MOJ), the beating of drums precedes these acts.

In rituals described in three texts (MOJ, TEO, MES 6), the main protagonist performs an action referred to either by the same verb (*may* 'to tell; to count') or two related verbs of speaking (*may* and *7anh.may* 'to instruct'). We do not know what was said in these cases. Ritual speech is also reflected textually by the use of 1st- and/or 2nd-person statements in three texts (MOJ, TEO, TUX); a god is involved or addressed in all three. It is reflected iconographically on MES 6 by a tiny speech scroll (Stirling 1943: 35; Justeson and Kaufman 2008: 173), and perhaps on MOJ by the element floating before the ruler's face (labelled by a glyph referring to the item in the ruler's outstretched hand).

We have detected no differences between rituals described in epi-Olmec texts of the Terminal Preclassic period (MOJ, TUX, CHP) and those from the Early Classic (TEO, MES).

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References

Adams, Richard E. W.
    1977   *Prehistoric Mesoamerica.* Boston: Little, Brown and Company.

Agrinier, Pierre
    1960   *The Carved Human Femurs from Tomb 1, Chiapa de Corzo, Chiapas, Mexico.* Papers of the New World Archaeological Foundation, Publication 5. Provo: Brigham Young University Press.

Ayala, Maricela
    1983   El origen de la escritura jeroglífica maya. In: *Antropología e historia de los mixe-zoques y mayas,* edited by Lorenzo Ochoa and Thomas A. Lee, Jr.: 175–221. Mexico City: Centro de Estudios Mayas, Instituto de Investigaciones Filológicas, Universidad Nacional Autónoma de México.

Bernal, Ignacio
    1968   *El mundo olmeca.* Mexico City: Editorial Porrua.
    1969   *The Olmec World.* Berkeley: University of California Press.

Clark, John E.
    2017   Mound 15 Caches and Burials in Site Perspective. In: *The Archaeological Salvage of Mound 15, Chiapa de Corzo, Mexico,* edited by Darlene Glauner, Suzanne Herman, and John E. Clark: 259–294. Papers of the New World Archaeological Foundation, Publication 81 Provo: Brigham Young University Press.

Coe, Michael D.
    1957   Cycle 7 monuments in Mesoamerica: a reconsideration. *American Anthropologist* 57(4): 597–611.
    1962   *Mexico.* London: Thames and Hudson.
    1965   Archaeological Synthesis of Southern Veracruz and Tabasco. In: *Handbook of Middle American Indians, Volume 3: Archaeology of Southern Mesoamerica, Part Two*: 679–715. Austin: University of Texas Press.

1970   The Archaeological Sequence at San Lorenzo Tenochtitlan, Veracruz. In: *Contributions of the University of California Archaeological Research Facility 8*: 21–34. Berkeley: University of California.

1976   Early Steps in the Evolution of Maya Writing. In: *Origins of Religious Art and Iconography in Preclassic Mesoamerica*, UCLA Latin American Series, vol. 31, edited by Henry B. Nicholson: 107–122. Los Angeles: Ethnic Arts Council of Los Angeles.

1977   Olmec and Maya: A Study in Relationships. In: *The Origins of Maya Civilization*, edited by Richard E. W. Adams: 183–195. Santa Fe: School of American Research.

1981   San Lorenzo Tenochtitlan. In: *Handbook of Middle American Indians: Supplement, Vol. 1*, edited by Victoria R. Bricker and Jeremy A. Sabloff: 117–146. Austin: University of Texas Press.

Daneels, Annick

2004   Máscaras de piedra de estilo teotihuacano en la costa del golfo. In: *La costa del golfo en tiempos teotihuacanos: propuestas y perspectivas*, edited by Maria Elena Ruiz Gallut and Arturo Pascual Soto: 393–426. Mexico City: Instituto Nacional de Antropologia e Historia.

Drucker, Philip

1943   *Ceramic Stratigraphy at Cerro de las Mesas, Veracruz.* Bureau of American Ethnology, Bulletin 141. Washington, D.C.: Smithsonian Institution.

Espenak, Fred and Jean Meeus

2006   *Five Millennium Canon of Solar Eclipses: -1999 to+3000 (2000 BCE to 3000 CE).* National Aeronautics and Space Administration (NASA) Technical Paper 2006-214141. Washington, D.C.: National Aeronautics and Space Administration. http://eclipse.gfsc.nasa.gov/SEcat5/SEcatalog.html.

Fischer, Henry George

1977   *The Orientation of Hieroglyphs. Part I: Reversals.* Egyptian Studies, II. New York: The Metropolitan Museum of Art.

Graham, Ian

1967   *Archaeological Explorations in El Peten, Guatemala.* Middle American Research Institute Publication 33. New Orleans: Tulane University.

Graham, John A.

1978   Abaj Takalik 1978: Exploratory Investigations. In: *Contributions of the University of California Archaeological Research Facility* 36: 85–109. Berkeley: University of California.

Heizer, Robert F.

1971   Commentary on: The Olmec region – Oaxaca. In: *Observations on the Emergence of Civilization in Mesoamerica*, edited by Robert F. Heizer and John A. Graham, with C. W. Clewlow, Jr.: 51–69. Contributions of the University of California Archaeological Research Facility 11. Berkeley: University of California.

Holmes, William H.

1907   On a Nephrite Statuette from San Andrés Tuxtla, Vera Cruz, Mexico. *American Anthropologist* 9(4): 691–701.

Houston, Stephen D. and Michael D. Coe

2003   Has Isthmian Writing Been Deciphered? *Mexicon* 25: 151–161.

Justeson, John

2007   Epi-Olmec Astronomy: A Circumnodal Venus Cycle. Paper presented at the annual meeting of the Society for American Archaeology, April 27, 2007.

2017   A Cyclic-time Model for Eclipse Prediction in Mesoamerica and the Structure of the Eclipse Table in the Dresden Codex. *Ancient Mesoamerica* 28(2): 507–514.

2018   *Day Names of Greater Lowland Mayan Divinatory Calendars.* Unpublished manuscript.

Justeson, John and Terrence Kaufman

1993   A Decipherment of Epi-Olmec Hieroglyphic Writing. *Science* 257: 1703–1711.

1994   Star Wars on the Preclassic Gulf Coast: The Chronology of La Mojarra Stela 1 and Its Astronomical Correlates. 10th Texas Symposium of the Maya Meetings at Texas (Star Wars: Venus/Tlaloc warfare in Mesoamerica). Austin, Texas, March 1994.

1996[1992] Un desciframiento de la escritura epi-olmeca: métodos y resultados. *Arqueología* 8 (1992): 15–25. [Appeared in the spring of 1996].

1997   A Newly-discovered Column in the Text on La Mojarra Stela 1: An Independent Test of the Epi-Olmec Decipherment. *Science* 273: 207–210.

2008   The Epi-Olmec Tradition at Cerro de las Mesas in the Classic Period. In: *Classic Period Cultural Currents in Southern and Central Veracruz*, edited by Philip J. Arnold III, and Christopher A. Pool: 159–194. Washington, D.C.: Dumbarton Oaks Research Library and Collection.

2012   Continuities in Epi-Olmec Ritual Practices Referred to in Hieroglyphic Texts. Paper presented at the symposium *Classic Veracruz Rising: Emergent Politico-Economic Complexity along Mexico's Gulf Lowlands, AD 100-600*, International Congress of Americanists, Vienna.

Kaufman, Terrence

in press a *Diccionario de la lengua zoque de Santa María Chimalapa.* Mexico City: Instituto Nacional de Lenguas Indígenas.

in press b *Diccionario de la lengua zoque de San Miguel Chimalapa.* Mexico City: Instituto Nacional de Lenguas Indígenas.

1988–2017 *The Day-names of the Meso-American Calendar: A Linguistic Perspective.* Unpublished manuscript.

Kaufman, Terrence and John Justeson

1993–2015 *The Decipherment of Zapotec Hieroglyphic Writing.* Unpublished manuscript.

2001   Epi-Olmec Hieroglyphic Writing and Texts. In: *Notebook for the XXVth Maya Hieroglyphic Forum at Texas* (March, 2001), Part 2: II-1–II-99.

2004a   The Epi-Olmec Language. In: *Encyclopedia of the World's Ancient Languages*, edited by Roger D. Woodard: 1071–1108. Cambridge: Cambridge University Press.

2004b   The Epi-Olmec Text on a Teotihuacan-style Mask. Paper presented at the Maya Meetings at Texas, March 18, 2004.

Kaufman, Terrence with John Justeson

2003   Preliminary Mayan Etymological Dictionary. Published online by the Foundation for the Advancement of Mesoamerican Studies, Inc. http://www.famsi.org/reports/01051/index.html.

Lowe, Gareth W.

1981   Olmec Horizons Defined in Mound 20, San Isidro, Chiapas. In: *The Olmec and Their Neighbors: Essays in Memory of Matthew W. Stirling*, edited by Elizabeth P. Benson: 231–255. Washington, D.C.: Dumbarton Oaks Research Library and Collection.

1989   The Heartland Olmec: Evolution of Material Culture. In: *Regional Perspectives on the Olmec*, edited by Robert J. Sharer and David Grove: 33–67. Cambridge: Cambridge University Press.

Lowe, Gareth W. and Pierre Agrinier

1960   *Excavations at Chiapa de Corzo, Chiapas, Mexico*, Papers of the New World Archaeological Foundation, Publication 7. Provo: Brigham Young University Press.

Lowe, Gareth W. and J. Alden Mason

1965   Archaeological Survey of the Chiapas Coast, Highlands, and Upper Grijalva Basin. In: *Handbook of Middle American Indians, Volume 2: Archaeology of Southern Mesoamerica, Part One*: 195–236. Austin: University of Texas Press.

Macri, Martha J.
  2016   A New Drawing of the Isthmian Inscription on a Feldspar Mask Published by
          Houston and Coe. *Glyph Dwellers*, Report 38. http://glyphdwellers.com/pdf/R38.
          pdf.
Macri, Martha J. and Laura M. Stark
  1991   A Sign List of the La Mojarra Script. In: *Literacies: Writing Systems and Literate
          Practices*, edited by David L. Schmidt and Janet S. Smith: 11–31. Davis Working
          Papers in Linguistics 4. Davis: University of California.
Marcus, Joyce
  1976   The Origins of Mesoamerican Writing. *Annual Review of Anthropology* 5: 35–67.
Martin, Simon and Joel Skidmore
  2012   Exploring the 584285 Correlation between the Maya and European Calendars. *The
          PARI Journal* 13(2): 3–16.
McBride, Harold
  1971   Figurine types of central and southern Veracruz. In: *Ancient Art of Veracruz*, edited
          by Olga Hammer: 23–30. Los Angeles: Ethnic Arts Council of Los Angeles.
Medellín Zenil, Alfonso
  1960   *Cerámicas de Totonacapan: Exploraciones arqueológicas en el centro de Veracruz.* Xalapa:
          Instituto de Antropología, Universidad Veracruzana.
  1971   *Monolitos ineditos y otros en el Museo de la Universidad de Veracruz.* Corpus Antiquitatum
          Americanensium. Mexico V. Mexico City: Instituto Nacional de Antropología e
          Historia.
  1987   *Nopiloa: Exploraciones arqueológicas.* Xalapa: Universidad Veracruzana.
Méluzin, Sylvia
  1995   *Further Investigations of the Tuxtla Script: An Inscribed Mask and La Mojarra Stela 1.* New
          World Archaeological Foundation Papers, no. 61. Provo: New World Archaeological
          Foundation, Brigham Young University.
Miller, Mary Ellen
  1991   Rethinking the Classic Sculptures at Cerro de las Mesas, Veracruz. In: *Settlement
          Archaeology of Cerro de las Mesas, Veracruz, Mexico*, Institute of Archaeology
          Monograph 34, edited by Barbara L. Stark: 26–38. Los Angeles: University of
          California.
Morley, Sylvanus G.
  1915   *An Introduction to the Study of the Maya Hieroglyphs.* Bureau of American Ethnology,
          Bulletin 57. Washington, D.C.: Smithsonian Institution.
Proskouriakoff, Tatiana
  1950   *A Study of Classic Maya Sculpture.* Carnegie Institution of Washington Publication
          593. Washington, D.C.: Carnegie Institution of Washington.
Stark, Barbara L.
  1974   Geography and Economic Specialization in the Lower Papaloapan Basin.
          Ethnohistory 21(3): 199–221.
  1977   *Prehistoric Ecology at Patarata 52, Veracruz, Mexico: Adaptation to the Mangrove Swamp.*
          Vanderbilt University Publications in Anthropology 18. Nashville: Vanderbilt
          University.
Stark, Barbara L. (ed.)
  1998   *Classic Period Mixtequilla, Veracruz, Mexico: Diachronic Insights from Residential
          Investigations.* Albany: Institute of Mesoamerican Studies, State University of New
          York at Albany.
Stark, Barbara L., Lynette Heller, and Michael A. Ohnersorgen
  1998   People with Cloth: Mesoamerican Economic Exchange from the Perspective of
          Cotton in South-Central Veracruz. *Latin American Antiquity* 9(1): 7–36.

Stirling, Matthew W.
  1939   Discovering the New World's Oldest Dated Works of Man. *The National Geographic Magazine* LXXVI(2): 182–218.
  1940   An Initial Series from Tres Zapotes, Vera Cruz, Mexico. *National Geographic Society, Contributed Technical Papers. Mexican Archaeology Series*, Vol. 1, No. 1.
  1943   *Stone Monuments of Southern Mexico.* Bureau of American Ethnology Bulletin 138. Washington, D.C.: Smithsonian Institution.

Suslak, Daniel Roberto
  in press *Diccionario colonial de la lengua zoquena del golfo de Ayapa, Tabasco.* Mexico City: Instituto Nacional de Lenguas Indígenas.

Taube, Karl
  2000   *The Writing System of Ancient Teotihuacan.* Ancient America 1. Barnardsville: Center for Ancient American Studies.

Wells, Bryan and David H. Kelley
  2006   *Isthmian Script and Its Decipherment.* Unpublished manuscript.

Wichmann, Søren
  1995   *The Relationship among the Mixe-Zoquean Languages of Mexico.* Salt Lake City: University of Utah Press.

Willey, Gordon
  1969   Review of Michael D. Coe, *America's First Civilization. Antiquity* X: 323–324.
  1977   The Rise of Classic Maya Civilization: A Pasión Perspective. In: *The Origins of Maya Civilization*, edited by Richard E. W. Adams: 133–157. Santa Fe: School of American Research.
  1990   Recent Advances in Maya Archaeology. *Bulletin of the American Academy of Arts and Sciences* 43(8): 24–35.
  1991   Horizontal Integration and Regional Diversity: An Alternating Process in the Rise of Civilizations. *American Antiquity* 56(2): 197–215.

Zavala Maldonado, Roberto
  in press *Diccionario colonial de la lengua zoque de Tecpatán, Chiapas.* Mexico City: Instituto Nacional de Lenguas Indígenas.